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ABSTRACT

This Vocational-Technical Education Consortium of States (V-TECS) catalog provides performance objectives and performance guides (teaching steps) associated with current occupational information relating to the job content of Business Machine Repair. Uses include validation of existing programs, testing of instructional effectiveness, determination of entering student competencies, evaluation of an instructional procedure or system, and curriculum design. One section describes the methodology used in conducting the project to develop the catalog. A brief discussion of elements of the catalog follows. The final and major section contains 128 performance objectives, each corresponding to a task (unit of work activity), arranged under four major duties: supervising and planning, selling office machines and services, maintaining and repairing typewriters, and maintaining and repairing duplicators. Each performance objective contains a condition, behavior, and standard of performance. Accompanying the performance objective are a listing of tools and equipment and a performance guide that lists recommended procedural steps in performing the task. Appendixes include (1) an equipment and tool listing showing numbers and percentages of workers using each piece of equipment, (2) listing of related materials, and (3) index of duties and tasks with a cross-reference table designed to aid teachers in adapting the objectives to individual programs. (YLB)

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VOCATIONAL-TECHNICAL
EDUCATION CONSORTIUM
OF STATES

BUSINESS MACHINE REPAIRER

A CATALOG OF TASKS, PERFORMANCE OBJECTIVES PERFORMANCE GUIDES, TOOLS AND EQUIPMENT

CE027 195

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BUSINESS MACHINE REPAIRER

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I. INTRODUCTION

The Vocational-Technical Education Consortium of States (V-TECS) is a cooperative research and development venture among 17 states and three associate agencies. The state membership consists of Alabama, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Michigan, Mississippi, New York, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin. The associate members are the Air Training Command of the U. S. Air Force, the U. S. Army Training and Doctrine Command, and the Naval Education and Training Command of the U. S. Navy. V-TECS is a component of the Commission on Occupational Education Institutions, Southern Association of Colleges and Schools.

V-TECS has developed an effective system for eliminating duplication of efforts, reducing production costs and providing high quality research-based materials that are transportable from developer to user states.

The primary products of V-TECS are comprehensive data, computer information banks and job relevant catalogs of performance objectives and performance guides. To insure confidence in the products, each product is developed according to established procedures as presented in the V-TECS Technical Reference Handbook.

The major components in the production cycle consisted of: (1) identification of job titles for specific areas of the occupation for which a task list is to be developed, (2) development of a task list within the domain of job titles, (3) comprehensive interviewing of job incumbents validating the task list, (4) selection of a random sampling of incumbent workers from the population of identified workers within the survey area, (5) administration of the occupational inventory to

the sample of incumbent workers, (6) analysis of data collected from the sample of workers, (7) identification and training of a writing team, (8) conversion of job-relevant task statements into performance objectives and performance guides, (9) analysis of information from the field review process, and (10) preparation of the final catalog.

II. DEFINITION OF TERMS

Catalog: A comprehensive collection of performance objectives, performance guides, criterion-referenced measures, and related data organized by a job structure or career ladder within a domain of interest.

Consortium: A group of state agencies, institutions, or other entities which have been legally constituted through letters of commitment, agreements, or by assignment of higher authorities to work together toward the solution of problems in education. A consortium, for the purposes of this work, must have membership from autonomous agencies and institutions which cut across state boundaries as they attempt to solve problems or meet goals.

Cross-Reference Table: A table that identifies the relationship among duties and tasks found in the occupational inventory and the performance objectives in the final catalog. Also noted are time-spent indices on all tasks by D.O.T.

Domain: A group of related job titles.

D.O.T. Code: A nine-digit number used to identify a specific job within a given domain.

Duty: A major segment of work comprising related tasks.

Field Review Survey: The procedure for collecting ratings from instructional personnel, content specialists, and persons familiar with criterion-referenced measurement on the utility and format of the performance objectives, criterion measures, and performance guides to aid in refining and further developing the finished catalogs.

Job: A group of tasks performed by a job incumbent.

Occupational Inventory (Task Inventory Booklet): A survey instrument containing tasks performed by job incumbents with D.O.T.'s, complete with background information and a list of tools and equipment.

Occupational Survey: The procedure for collecting data to identify the duties and tasks that comprise one or more jobs, job types, or career field ladders, for the collection and analysis of information concerning such duties.

Performance Guide (PG): A series of steps arranged in a sequence ordinarily followed which, when completed, may result in the performance of a task. Also, called "teaching steps".

Performance Objective (PO): A statement in precise, measurable terms of a particular behavior to be exhibited by a learner under specified conditions.

Project: An occupational domain area selected by a V-TECS member state for catalog development based upon the U. S. Department of Labor's Dictionary of Occupational Titles (D.O.T.) having a minimum of one and a maximum of five related D.O.T.'s.

Stanine Values: The stanine is a rating scale of 1-9 which provides for a distribution of items across a numerical range assigned to the items. Stanine Values are computed using the following calculations:

Stanine Value	Percentage
9	4 top
8	7
7	12
6	17
5	20 middle
4	17
3	12
2	7
1	4 bottom

Range 1-9 Total 100%

State-of-the-Art (SOA) Study: Research conducted to determine the current status of performance-based instructional materials and practices in the domain area under study and to obtain other information that might be useful in catalog development.

Task: A unit of work activity which constitutes logical and necessary steps in the performance of a duty. A task has a definite beginning and ending point in its accomplishments and generally consists of two or more definite steps.

Task Analysis: The process of reviewing elements of a job for the purpose of improving training program content across program levels of vocational-technical education.

Task Criticality: A characteristic of a task statement which makes its accomplishments crucial to the acceptable performance of a worker or student.

Task Time-Spent Index: An index of relative time spent on each task within a domain of interest and appearing on a task list. The task time-spent index is computed from scientifically selected samples of incumbent workers who respond to a task listing in an occupational inventory booklet.

Writing Team: A team of people representing instructors with subject matter expertise, persons having knowledge and experience in developing criterion-referenced measures, local or state supervisors in the domain being developed, workers, and supervisors if incumbent workers whose function is to analyze occupational data and develop performance objectives and criterion-reference measures for specific D.O.T. areas.

III. PURPOSE OF THE CATALOG

This catalog was designed to provide performance objectives and performance guides associated with current occupational information relating to the job content of Business Machine Repair.

Listed below are several of the intended uses of the catalog:

1. Objectives may be used to validate existing programs.
2. Performance objectives may be used to test the effectiveness of instruction in terms of measurable student achievement.
3. Performance objectives may be used to determine entering student competencies, thus allowing for advanced placement, individualization of instruction, etc.
4. Measurement outcomes may be used to accept, improve, or reject an instructional procedure or system.
5. Performance guides may be used as a blueprint for designing curriculum which will support selected performance objectives.

IV. DEVELOPMENT OF THE CATALOG

The methodology utilized in conducting the project to develop performance objectives and performance guides for Business Machine Repair is described in the following paragraphs:

Preliminary Research

A state-of-the-art study was performed as an initial step in the project development. This research was done to determine the status of performance-based instructional materials and practices employed in the domain area of Business Machine Repair. The results of this study assisted in the identification of a tentative task listing, equipment and tools list, and respondent background information sheet. The findings of the state-of-the-art were reviewed, expanded, and critiqued through interviews with incumbent workers, instructors, and subject matter specialists in business. Interviewing was continued until the task and equipment listings were fully developed. This led to the development of the Business Machine Repair Occupational Inventory. The inventory consisted of a background information form, equipment/tool list, five duty statements, and 203 tasks.

Description of the Sample

The job titles addressed in the survey were: Office Machine Serviceman (D.O.T. 633.281-030), Office Machine Serviceman Supervisor (D.O.T. 633.131-030), and Office Machine Servicer Apprentice (D.O.T. 633.281-034).

An Office Machine Serviceperson repairs machines such as adding, accounting, calculating, and typing machines using hand tools, power tools, micrometers, and welding equipment. A serviceperson may operate, test,

disassemble, examine, adjust, replace, clean, oil, and assemble machines. This person frequently instructs operators in the operation, care, and maintenance of office machines.

An Office Machine Serviceman Foreman, however, supervises and coordinates worker activities, reviews reports, evaluates serviceperson's repaired machines, computes estimates, studies production, interprets company policy, specifications, and job orders, assigns duties, schedules deadlines, analyzes and solves work problems and grievances, recommends personnel action, and maintains records.

The Office Machine Servicer Apprentice is an entry-level occupation that requires two to six years of on-the-job instruction and trade instruction. An apprentice typically learns work processes, materials characteristics, shop mathematics, and blueprint reading.

A random sample of 82 persons was selected. There was a 79% return rate with 62% of the instruments being usable. The reliability of the respondents to the difficulty survey as determined by coefficient alpha is .9540.

Analysis of Data

The occupational inventory survey provided data for four basic reports currently being provided by V-TECS. These reports are: (1) Percent Performing by D.O.T., (2) Duties and Task Listings, (3) Cumulative Time Spent Stanine Value by D.O.T., and (4) Equipment and Tools by Percentage Using. Tasks used in this catalog were identified as follows:

1. Tasks by D.O.T. falling above the 90 percent level by cumulative sum of average percent time spent by all members were retained; the exception being extremely simple tasks.

2. Tasks by D.O.T. falling below the 90 percent level by cumulative sum of average percent time spent by all members were eliminated; the exception being those tasks deemed as critical by the writing team.

The Writing Team

The writing team consisted of persons including the Project Director. Each person was selected as meeting one or more of the following criteria: (1) editing experience, (2) content expertise, (3) teaching experience, (4) recent work experience, (5) curriculum writing experience, and (6) job supervision.

The training of the writing team was conducted by the Project Director with help from a member of the V-TECS central staff and the Technical Coordinator. Following a review of a draft copy by the V-TECS central staff, revisions were made by Project Director.

Upon examination of the tasks in duty group D, entitled "Maintaining and Repairing Calculators," the writing team unanimously agreed that these tasks were hopelessly outdated and should, therefore, be eliminated from the catalog. They recommended that a future inventory should include electronic, not mechanical, calculators.

The Field Review

Field review techniques were established to insure quality control, to provide continuity of format, and to guarantee the objectives to be job related. The purpose of the field review was to provide input from a carefully selected group of persons from several states who performed the following tasks: (1) reviewed all sections of the catalog, (2) edited for format and technical content, and (3) evaluated each stated duty and task, performance objective, and performance guide as related to each D.O.T. covered in the field review copy.

The review team was asked to analyze the recommendations from the field review and to provide further information on standards, conditions, behaviors, or the steps necesaary in performing the tasks. Individuals were identified to serve on the field review team. The input from the field review was examined and used by the writing team in the completion of the final catalog. The field review provided information on the writing, format, and comments relating to a variety of educational needs and demands for possible innovative designs.

V. ELEMENTS OF THE CATALOG

The catalog is comprised of performance objectives and performance guides which were prepared from job-related statements from an occupational inventory.

Each performance objective contains the following elements:

1. The condition under which the student will perform the objective.

2. The behavior the student should exhibit after instruction has taken place.

3. The standard of performance as set by people who are successful incumbent workers and documented from one of the three sources outlined below:

   (a) The primary source of performance standards is job-based information provided in technical manuals, certification requirements or other germane literature.

   (b) The secondary source of performance standards is the level of performance agreed upon by incumbent workers and supervisors who served on the writing team or as consultants to the team.

   (c) The third source of performance standards are the subject matter specialists; used only as a resource when the first two sources are unavailable.

The source of the standard is identified in parentheses after each performance objective, i.e., (14) or (22, 44). The first number in the parentheses refers to a source identified in the List of References and the second number, if there is one, refers to the page number. A listing of a reference in no way implies that this is the only source of an appropriate standard and certainly should not be construed as a blanket endorsement of the organization or publication from which the standard was secured. There may be other valid sources in addition to the one(s) cited.

The performance guides which accompany the objectives are procedural steps and may be reviewed to obtain enabling objectives. They constitute a recommended way to perform the task. Other approaches might be acceptable and alteration of the performance guides may be necessary because of equipment, geographic location, or varying conditions. One performance guide is provided for each objective.

The catalog contains three appendices. An equipment and tool listing is included in Appendix A, showing the numbers and percentages of workers using each piece of equipment. Appendix B is a listing of related materials included in the state-of-the-art study conducted prior to the development of the preliminary occupational inventory booklet. Appendix C is an index of duties and tasks with a cross-reference table designed to aid teachers in adapting the objectives to individual programs.

VI. PERFORMANCE OBJECTIVES, CRITERION-REFERENCED MEASURES, AND PERFORMANCE GUIDES

Duty: SUPERVISING AND PLANNING

Task: Demonstrate Office Machine Repair Tasks to Personnel

---

1. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, demonstrate office machine repair tasks to personnel so that personnel can perform task without procedural error.

TOOLS AND EQUIPMENT

Standard office machine repair kit
Handbook
Service manuals

PERFORMANCE GUIDE

1. Locate service manual to correspond with needed repairs.
2. Advise employee of section to correspond with needed repairs.
3. Familiarize personnel with repair tasks.
4. Explain hand tools to be used.
5. Explain special equipment to be used.
6. Show workers how to perform each step of a particular task.
7. Review safety precautions to be used.

Duty: SUPERVISING AND PLANNING

Task: Evaluate Shop Production

---

2. PERFORMANCE OBJECTIVE

Given equipment listed, calculate the total shop performance on profitable and non-profitable equipment for one week. The evaluation must provide sufficient information to establish labor and parts expenses and a profit margin.

TOOLS AND EQUIPMENT

Shop production forms

PERFORMANCE GUIDE

1. Distribute the work.
2. Record all parts used.
3. Record all labor hours on each unit repaired.
4. Account for all absentees and lost hours.
5. Plan for vacations and non-productive hours.
6. Compare shop production to projected monthly production and profit margin.

Duty: SUPERVISING AND PLANNING

Task: Evaluate Worker Performance

---

3. PERFORMANCE OBJECTIVE

Given the tools and equipment listed and worker who knows his/her duties and schedules, evaluate worker performance against quality and quantity standards. The evaluation must provide sufficient information to establish salary and/or merit raises or a promotion.

TOOLS AND EQUIPMENT

Repair cards
Time utilization worksheets

PERFORMANCE GUIDE

1. Total the worker's repair cards and time utilization worksheets.
2. Check the accuracy of worker's adjustments.
3. Rate worker's performances, attitudes, and habits as acceptable or unacceptable.
4. Determine worker's potential for promotion.
5. Calculate worker's merit and/or salary raise.
6. Complete a written evaluation for each worker.

Duty: SUPERVISING AND PLANNING

Task: Conduct Inventory

---

4. PERFORMANCE OBJECTIVE

Given the necessary tools and equipment listed, inventory supply parts, tools, equipment, and record totals. Inventory totals must be 100% accurate.

TOOLS AND EQUIPMENT

Inventory cards

PERFORMANCE GUIDE

1. List supplies, parts, tools, and equipment needed to be inventoried.
2. Count total for one item.
3. Record total.
4. Repeat steps two and three for each item.
5. Update master inventory cards to reflect actual inventory.

Duty: SUPERVISING AND PLANNING

Task: Organize Shop Layout

---

5. PERFORMANCE OBJECTIVE

Given the equipment listed, plot a suggested layout on graph paper. Organize the shop layout in an efficient, economical, and safe arrangement. Performance must reflect selections which are within a recommended budget, appropriate for a shop, and O.S.H.A. approved.

TOOLS AND EQUIPMENT

Shop blueprint
Graph paper
O.S.H.A. regulations
Space requirements
Equipment list
Budget

PERFORMANCE GUIDE

1. Evaluate the floor space needed by each service engineer, storage room required, parts department required, cleaning room required, and painting area required.
2. Plan storage room, cleaning room, parts room, and painting area to be efficient and attractive.
3. Plan safety procedures for the shop area.
4. Plan lighting.

Duty: SUPERVISING AND PLANNING

Task: Orient Workers on Shop Practices

---

6. PERFORMANCE OBJECTIVE

Given the equipment listed, orient workers on shop practices. Each task must be assigned and responsibilities clearly defined.

TOOLS AND EQUIPMENT

Sample shop work orders

PERFORMANCE GUIDE

1. Introduce worker to co-workers.
2. Familiarize workers with work routine, shop facilities, and shop policies.
3. Demonstrate unfamiliar procedures for workers.
4. Assign tasks and list responsibilities.
5. Answer all questions.

Duty: SUPERVISING AND PLANNING

Task: Prepare Shop Budget

---

7. PERFORMANCE OBJECTIVE

Given the forms listed in the tools and equipment section, prepare a shop budget. The shop budget should project the inflation rate for expenses and income for the current period. The completed budget must be mathematically correct, show income greater than expenses, and conform to the employer's expectations and policies.

TOOLS AND EQUIPMENT

Personnel records
Expense budget sheet
List of costs per call
Monthly income statements

PERFORMANCE GUIDE

1. Estimate cost of shop equipment maintenance.
2. Estimate cost of preventative maintenance.
3. Estimate percentage of salary increase for engineers.
4. Estimate travel expenses.
5. Estimate training expenses.
6. Estimate parts and supplies expenses.
7. Estimate tools and equipment expense.
8. Estimate total expenses.
9. Calculate cost per call (labor and parts).
10. Calculate percentage of profit on parts and supplies.
11. Calculate mileage to be charged to customers.
12. Calculate projected income.
13. Subtract estimated expenses from estimated income.
14. Prepare budget; submit to owner or general manager for approval.

Duty: SUPERVISING AND PLANNING

Task: Prepare Work Schedules and Assignments

8. PERFORMANCE OBJECTIVE

Given the equipment listed, prepare work schedules and assignments. Work tasks must be scheduled and assigned to workers so that they correspond to each worker's qualifications.

TOOLS AND EQUIPMENT

Sample shop work orders

PERFORMANCE GUIDE

1. Determine work requirements.
2. Determine work priorities.
3. Schedule work for specific workers according to abilities.
4. Give complete and clear instructions to workers who need additional assistance.

Duty: SUPERVISING AND PLANNING

Task: Process Repair Work

9. PERFORMANCE OBJECTIVE

Given the tools and equipment listed and a list of jobs and delivery date, process repair work so that repair turnaround time meets date promised to customer.

TOOLS AND EQUIPMENT

Service invoice
Work and parts order

PERFORMANCE GUIDE

1. Calculate cost of repairs by job.
2. Calculate cost of parts by job.
3. Calculate cost of labor by job.
4. Determine date to be delivered to customer.
5. Furnish any required loan machine.
6. Arrange for delivery and pickup of loan machine.
7. Deliver customer invoice.

Duty: SUPERVISING AND PLANNING

Task: Receive Maintenance Contract Machines

---

10. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, receive a maintenance contract machine. All necessary forms must be completed with 100% accuracy.

TOOLS AND EQUIPMENT

Service log form

PERFORMANCE GUIDE

1. Log customer call by territory.
2. Record name, address, and phone number on service call form.
3. Record description or type of necessary maintenance on log form.

Duty: SUPERVISING AND PLANNING

Task: Receive New Office Machines

---

11. PERFORMANCE OBJECTIVE

Given the equipment listed, receive new office machines. All necessary forms must be completed with 100% accuracy.

TOOLS AND EQUIPMENT

Receiving form
New office machines
Sales forms
Shipping request form

PERFORMANCE GUIDE

1. Record date machine was received.
2. Record type of machine received.
3. Record serial number and model.
4. Complete any needed damage report.
5. Attach purchase order number if machine was a "special order."

Duty: SUPERVISING AND PLANNING

Task: Requisition Supplies and Parts

---

12. PERFORMANCE OBJECTIVE

Given the tools and equipment listed and the quantity of supplies and parts to be ordered, complete a requisition form. The request should contain quantities with part numbers, references, and prices if known. The request should be completed with 100% accuracy.

TOOLS AND EQUIPMENT

Supply manual
Parts catalog
Price manuals
Purchase order
Parts order form

PERFORMANCE GUIDE

1. Obtain a list of supplies or parts needed.
2. Complete a requistion form.
3. Complete purchase order and parts order form.

Duty: SUPERVISING AND PLANNING

Task: Requisition Tools and Equipment

13. PERFORMANCE OBJECTIVE

Given the tools and equipment listed and the quantity of tools and equipment to be requested, complete a requisition form. The requisition should contain quantities with tool numbers or equipment description and prices if known. The form should be completed with 100% accuracy.

TOOLS AND EQUIPMENT

Tools and supply manuals
Parts manuals
Price books
Purchase order
Parts order form

PERFORMANCE GUIDE

1. Obtain a list of tools and supplies.
2. Complete a requisition form.
3. Complete purchase order.
4. Attach purchase order if required.

Duty: SUPERVISING AND PLANNING

Task: Write Shop Personnel Requirements

---

14. PERFORMANCE OBJECTIVE

Given the equipment listed, write shop personnel requirements that are easily understood, clearly defined, completely detailed, and grammatically correct.

TOOLS AND EQUIPMENT

List of company needs, duties, and standards

PERFORMANCE GUIDE

1. Survey needs of shop.
2. List standards for company regarding special equipment, tools, and repair personnel must handle.
3. List education, training, and experience needed by personnel to handle shop duties.
4. Set objectives for scheduled repair dates personnel must meet.
5. Set minimum and maximum repair rates personnel must work within.
6. Itemize types of customer calls and problems personnel must explain and solve.
7. List procedures personnel must follow when checking out rentals and loan equipment.
8. List tasks that sales and equipment personnel require of shop personnel regarding technical problems.
9. Write job description to fit company objectives and standards.

Duty: SUPERVISING AND PLANNING

Task: Write Shop Repair Equipment Requirements

15. PERFORMANCE OBJECTIVE

Given a list of typical shop repairs, write shop repair equipment requirements. The repair equipment requirements must be easily understood, clearly defined, completely detailed, and grammatically correct.

TOOLS AND EQUIPMENT

Sample shop repair list

PERFORMANCE GUIDE

1. Estimate useful life of equipment.
2. Determine repair/replacement costs for equipment.
3. Write standards for a cost-effective repair policy.

Duty: SELLING OFFICE MACHINES AND SERVICES

Task: Calculate Price to Charge

---

16. PERFORMANCE OBJECTIVE

Given the equipment listed, salesperson's percent of commission sheet, and freight charges, calculate price to charge customer so that the company's profit objective is obtained.

TOOLS AND EQUIPMENT

Sales invoice

PERFORMANCE GUIDE

1. Check invoice.
2. Calculate profit needed.
3. Calculate salesperson's commission.
4. Calculate selling price.

Duty: SELLING OFFICE MACHINES AND SERVICES

Task: Calculate Repair Costs

---

17. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, a machine, parts price manual, and flat labor per hour cost, calculate total cost of repairs. The estimate must be within 10% of that determined by the instructor.

TOOLS AND EQUIPMENT

Repair cost list
Hourly labor charge form

PERFORMANCE GUIDE

1. Determine repairs needed.
2. Identify parts needed.
3. Price parts needed.
4. Determine the number of hours for repair.
5. Total all expenses (parts and labor).

Duty: SELLING OFFICE MACHINES AND SERVICES

Task: Complete a Sales Slip

---

18. PERFORMANCE OBJECTIVE

Give the equipment listed, prepare a sales slip for inventory. All applicable spaces on the sales slip must be accurately completed and all calculations must be 100% accurate.

TOOLS AND EQUIPMENT

Sales slip

PERFORMANCE GUIDE

1. Obtain sales slip.
2. List style.
3. Complete serial number and model on sales slip.
4. List customer's qualification for discounts and terms.
5. List price.
6. List salesperson's commission.
7. List taxes (or note exemptions).
8. Obtain customer's signature on sales slip.

Duty: SELLING OFFICE MACHINES AND SERVICES

Task: Demonstrate Office Machine Operation

---

19. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, demonstrate office machine features to customer's satisfaction.

TOOLS AND EQUIPMENT

Office machine

PERFORMANCE GUIDE

1. Adjust operator's position at the machine.
2. Turn machine "on."
3. Show operator machine features - parts and their operation.
4. Ask operator to try out the machine.
5. Ask for questions.
6. Leave machine for evaluation.
7. Leave business card.
8. Return later for closing.

Duty: SELLING OFFICE MACHINES AND SERVICES

Task: Receive Office Machine for Repair

---

20. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, receive office machine for repair. The form must contain all information required to repair a machine to customer's specifications. All applicable items on the repair form must be completed correctly and within 10% of the instructor's findings.

TOOLS AND EQUIPMENT

Office machine report form

PERFORMANCE GUIDE

1. Determine kind of repairs.
2. Complete work order.
3. Calculate labor to repair.
4. List parts required.
5. Estimate repairs.
6. Estimate delivery or pickup date.
7. Distribute forms.

Duty: SELLING OFFICE MACHINES AND SERVICES

Task: Sell New Office Machines

---

21. PERFORMANCE OBJECTIVE

Given a potential sales lead, arrange an appointment and sell new office machines that meet the customer's needs.

PERFORMANCE GUIDE

1. Determine background and preference of customers.
2. Select appropriate machine based on customer's needs.
3. Demonstrate machine operation.
4. Ask and answer questions.
5. Close sale.

Duty: SELLING OFFICE MACHINES AND SERVICES

Task: Sell Parts

---

22. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, sell parts that meet the customer's needs.

TOOLS AND EQUIPMENT

Sales and order form
Parts catalogs
Pricing list

PERFORMANCE GUIDE

1. Determine part needed.
2. Select appropriate parts catalog.
3. Select appropriate price catalog.
4. Determine parts availability.
5. Complete sales slip.
6. Close sale.

Duty: SELLING OFFICE MACHINES AND SERVICES

Task: Update Parts Catalogs

---

23. PERFORMANCE OBJECTIVE

Given the tools and equipment listed and updated pages and prices, update parts catalog to exact manufacturer's directions.

TOOLS AND EQUIPMENT

Parts catalog
Updated pages

PERFORMANCE GUIDE

1. Locate parts catalogs to be changed.
2. Remove obsolete pages.
3. Insert updated pages and add corrections.
4. Return catalogs to proper location.

Duty: SELLING OFFICE MACHINES AND SERIVES

Task: Update Service Manuals

---

24. PERFORMANCE OBJECTIVE

Given the equipment listed and update changes for service manual, update the service manual. The added or changed pages must be correctly inserted in specific areas of the manual page by page, line by line.

TOOLS AND EQUIPMENT

Service manual

PERFORMANCE GUIDE

1. Locate service manuals to be changed.
2. Remove obsolete pages.
3. Insert updated pages and corrections.
4. Return manuals to proper location.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Aligning Scales

---

25. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust aligning scale so that scale does meet, i's are vertically aligned, and narrow white line appears at bottom of characters.

TOOLS AND EQUIPMENT

Typewriter
Screwdriver
Service manual

PERFORMANCE GUIDE

1. Insert paper.
2. Type line of small i's.
3. Loosen aligning scale screws.
4. Align small i's to scale mark.
5. Tighten screws.
6. Remove paper.
7. Reinsert paper.
8. Align with newly-aligned scale paper.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Backspace Pawl

---

26. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust backspace pawl so that when depressing backspace key with variable speeds carriage moves back one space.

TOOLS AND EQUIPMENT

T-bender
Screwdriver
Service manual

PERFORMANCE GUIDE

1. Depress backspace key.
2. Inspect for maladjustment.
3. Remove cover plates, feed rolls, paper pan, platen.
4. Perform sequence of adjustments on backspace pawl.
5. Replace parts.
6. Check for performance.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Bichrome Mechanism

---

27. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust the bichrome mechanism so that upon depression of a key the selected character is printed on the paper clearly.

TOOLS AND EQUIPMENT

Thin-blade driver
Bichrome forming tools (offset and straight)
Needle nose pliers
Typewriter

PERFORMANCE GUIDE

1. Position the typewriter for access.
2. Inspect for maladjustment.
3. Eliminate binds.
4. Adjust ribbon vibrator position.
5. Adjust for proper "throw."
6. Form any necessary parts.
7. Check accuracy of adjustments.
8. Replace typewriter to normal.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Carriage Clamps

---

28. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust carriage clamps so carriage will roll from left to right smoothly.

TOOLS AND EQUIPMENT

Screwdriver
Manual typewriter

PERFORMANCE GUIDE

1. Disconnect draw band.
2. Position all bearings and pinions.
3. Snub up carriage clamps.
4. Eliminate play in carriage.
5. Minimize binds.
6. Connect draw band.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Carriage Cord Tension

29. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust carriage cord tension so that the carriage will move smoothly from the left margin completely to the right carriage end.

TOOLS AND EQUIPMENT

Screwdriver
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Measure spring tension.
3. Adjust draw band.
4. Test the machine.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Carrier Return Mechanism

---

30. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust carrier return mechanism so that carrier moves quietly and smoothly.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Spring scale
Electric typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Secure carrier return latch height.
3. Provide proper pawl clearance.
4. Measure clutch latch overthrow.
5. Check overlap of carrier return shoe.
6. Align carrier return clutch arm.
7. Obtain proper shoe clearance.
8. Check overbanking.
9. Adjust clutch unlatching link.
10. Measure torque limiter pull.
11. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Carrier Return Cord

---

31. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust carrier return cord so that the carrier returns smoothly.

TOOLS AND EQUIPMENT

Screwdriver
Spring scale
Electric typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Obtain proper mesh of gears.
3. Position tab governor pinion.
4. Adjust cord tension.
5. Measure main spring tension.
6. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust carrier Return Cord Tension

---

32. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust carrier return cord tension so that carrier is pulled to extreme right.

TOOLS AND EQUIPMENT

Screwdriver
Electric typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Turn main spring cage to a new location.
3. Check for proper tension.
4. Replace cover.
5. Return machine to typing position.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Drive Belt (or Main Motor) Mechanism

---

33. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust drive belt (or main motor) mechanism so that all belts operate typewriter smoothly and quietly.

TOOLS AND EQUIPMENT

Screwdriver
Electric typewriter

PERFORMANCE GUIDE

1. Remove necessary covers.
2. Check for proper belt tension.
3. Position motor housing screws.
4. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Escapement Rack Teeth

34. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust escapement rack teeth to ride in pinion so the carriage moves smoothly and quietly.

TOOLS AND EQUIPMENT

Wrench
Screwdriver
Duck bill pliers
Manual typewriter

PERFORMANCE GUIDE

1. Remove carriage covers.
2. Obtain the correct mesh of feed rack.
3. Provide slight clearance for rack release levers and rack bail.
4. Limit upward movement of feed rack bail.
5. Align rack bail.
6. Eliminate side play.
7. Replace carriage covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Escapement Starwheel

35. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust the escapement starwheel so that when escapement spaces, starwheel turns freely.

TOOLS AND EQUIPMENT

Duck bill pliers
Wrench
Manual typewriter
Feeler gauge
Screwdriver

PERFORMANCE GUIDE

1. Remove covers.
2. Check the pitch of starwheel, pinion, and check pawl.
3. Check condition of pinion pawl and spring.
4. Check condition of universal bar.
5. Check all springs on key lever links.
6. Measure and adjust distance between loose dog and rigid dog.
7. Adjust rocker assembly.
8. Form front limit bracket.
9. Adjust master trip.
10. Adjust individual trip.
11. Check and form back limit.
12. Check and adjust drop screw.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust for Negative Rotation

---

36. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust for negative rotation so the rotate bail crank rotates clockwise.

TOOLS AND EQUIPMENT

Cycle tool
1/4" open end wrench
1/4" flat-blade screwdriver
Tension scale for main spring tension
Electric typewriter

PERFORMANCE GUIDE

1. Remove cover plates.
2. Locate stop screw for negative latch bail.
3. Adjust negative latch bail stop screw.
4. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust for Positive Rotation

---

37. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust for positive rotation so when operating the rotate bail crank counter-clockwise, it will create a pull on the rotate tape.

TOOLS AND EQUIPMENT

1/4" socket wrench
1/8" flat-blade screwdriver
1/4" open-end wrench
Tension scale for main spring
Cycle tool
Typewriter repair manual
Electric typewriter

PERFORMANCE GUIDE

1. Remove cover plates.
2. Observe rotate differential at rest position.
3. Determine rotate operation.
4. Adjust according to service manual.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust for Proper Tilt

---

38. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust for proper tilt so that the tilt mechanism positions the typehead vertically to any of the four character bands.

TOOLS AND EQUIPMENT

1/8" flat-blade screwdriver
Spline Allen wrench
Cycle tools
Shim stocks
Electric typewriter

PERFORMANCE GUIDE

1. Remove all necessary cover plates.
2. Remove type element.
3. Adjust set screw.
4. Adjust shaft end play.
5. Loosen the tilt ring pivot pin set screws.
6. Insert shims in the upper bail socket.
7. Set the tilt detent.
8. Replace cover.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Tilt Latches

---

39. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust tilt latches so that tilt ring operates selected band of characters on the type element.

TOOLS AND EQUIPMENT

Bristol wrench
T-bender
Electric typewriter
Electric typewriter manual

PERFORMANCE GUIDE

1. Remove necessary covers.
2. Time print shaft.
3. Form tilt selector stop pads.
4. Adjust the tilt link.
5. Check and adjust tilt tape arm screw.
6. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Front Feed Rolls

40. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust the front feed rolls so paper feeds firmly and evenly.

TOOLS AND EQUIPMENT

Spring scale
Screwdriver
Manual typewriter

PERFORMANCE GUIDE

1. Remove cylinder scale.
2. Measure feed roll tension.
3. Adjust pressure screws.
4. Position paper pan.
5. Replace cylinder scale.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Index Mechanism

---

41. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust index mechanism to move the platen vertically one space.

TOOLS AND EQUIPMENT

Hooverometer
Feeler gauge
Electric typewriter

PERFORMANCE GUIDE

1. Remove necessary covers.
2. Measure movement of index link.
3. Rotate index link to desired movement.
4. Center index pawl on cam surface.
5. Replace necessary covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Keyboard Selection Mechanism

---

42. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust keyboard selection mechanism so that the differential latches operate to print the desired character.

TOOLS AND EQUIPMENT

Electric typewriter
Electric typewriter manual
Screwdriver

PERFORMANCE GUIDE

1. Remove the cover plates.
2. Adjust filter shaft gear.
3. Position rear interposers guide comb.
4. Locate cycle bail on interposers.
5. Set interposer latch springs.
6. Position cycle clutch latch overlap.
7. Restore cycle clutch latch.
8. Clear the cycle clutch release point.
9. Position the interposer latch spring.
10. Adjust the cycle clutch bail upper stop.
11. Position the front key lever guide comb.
12. Perform adjustment sequence for selector compensator.
13. Position differential guides.
14. Form stop lugs for respective selector bail clearance.
15. Adjust selector latch links.
16. Adjust switch link to obtain proper height.
17. Adjust the lockout bail link.
18. Adjust lockout bail bracket.
19. Adjust keyboard lock bell crank link.
20. Adjust operational lockout shaft link.
21. Replace any covers removed during adjustment.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Key Levers

---

43. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust key levers so that there is a uniform operating force on all key levers.

TOOLS AND EQUIPMENT

Spring hook
Manual typewriter

PERFORMANCE GUIDE

1. Position height.
2. Obtain proper spring tension.
3. Limit downward travel or movement.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Line Lock

---

44. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust line lock to lock out all key levers simultaneously.

TOOLS AND EQUIPMENT

T-bender
Duck bill pliers
Screwdriver
Center stop wrench
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Align margin bails.
3. Adjust center stop.
4. Position line lock lever.
5. Position line lock link.
6. Obtain proper play in line lock plate.
7. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Line Space Mechanism

---

45. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust the line space mechanism to evenly space the platen.

TOOLS AND EQUIPMENT

Wrench
Spring hook
Screwdriver
Manual typewriter

PERFORMANCE GUIDE

1. Obtain proper spring tension.
2. Position line space lever eccentric screw.
3. Synchronize line space pawl and detent roller.
4. Check "creeping" of cylinder.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Mainspring

---

46. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust mainspring to pull the carriage completely to the left.

TOOLS AND EQUIPMENT

Screwdriver
Spring scale
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Measure draw band tension.
3. Secure proper tension.
4. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Margin Release

---

47. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust the margin release to release the left and right margins uniformly.

TOOLS AND EQUIPMENT

Duck bill pliers
T-bender
Screwdriver
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Form margin release link.
3. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Motor Belts

---

48. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust motor belts to operate quietly.

TOOLS AND EQUIPMENT

Screwdriver
Allen wrench
Electric typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Align pulleys.
3. Adjust motor mounting brackets for belt tension.
4. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Motor Pulleys

---

49. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust motor pulleys to operate silently and evenly.

TOOLS AND EQUIPMENT

Screwdriver
Allen wrench
Electric typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Align pulleys.
3. Adjust grip clip to limit side movement.
4. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Operational Control Mechanism

---

50. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust operational control mechanism so that all powered service operations on the machine perform as in original condition.

TOOLS AND EQUIPMENT

Screwdriver
Bristol screwdriver
Electric typewriter

PERFORMANCE GUIDE

1. Remove all cover plates.
2. Check all powered service operations related to space bar, backspace, carrier return, indexing, and the shift.
3. Lubricate operational control shaft.
4. Adjust to eliminate excessive cam movement.
5. Replace cover plates.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Print (Impression) Mechanism

---

51. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust print (impression) mechanism so that the type head is activated and each character selected comes up and prints with a clear impression.

TOOLS AND EQUIPMENT

Hooverometer
Bristol screwdriver
Feeler gauge
Spring hook
Electric typewriter

PERFORMANCE GUIDE

1. Remove cover plates.
2. Adjust copy control lever.
3. Lock copy control eccentric retaining plate to correct position.
4. Loosen platen latch eccentric screw.
5. Position platen with Hooverometer.
6. Adjust carrier shoe.
7. Move velocity control plate pin.
8. Adjust carrier support.
9. Adjust the cam follower stop screw.
10. Position the velocity control cable.
11. Adjust low velocity latch link.
12. Adjust low velocity cam.
13. Loosen the screw for low velocity cam following stop.
14. Measure power travel.
15. Adjust for free flight.
16. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Rear Feed Rolls

---

52. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust rear feed rolls to feed paper into machine completely.

TOOLS AND EQUIPMENT

Spring scale
Screwdriver
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers and necessary parts.
2. Check platen play.
3. Measure feed roll tension.
4. Adjust for proper tension.
5. Position paper pan.
6. Replace covers and necessary parts.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Ribbon Feed Mechanism

---

53. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust ribbon feed mechanism to advance the ribbon so that an unused portion is aligned with the selected character.

TOOLS AND EQUIPMENT

Small blade screwdriver
Allen wrench set
Duck bill pliers
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Check spring barrel tension.
3. Obtain proper mesh of gears.
4. Adjust for drag on the spools.
5. Check for sufficient spring tension on ribbon spool springs.
6. Secure all set screws.
7. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Ribbon Reverse Control

---

54. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust ribbon reverse control so the ribbon reverses automatically.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Allen wrench set
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Obtain clearance of ribbon spool cups.
3. Check trip lever.
4. Adjust for proper spring tension on automatic reverse arms.
5. Check for sufficient spring tension on reverse lock spring.
6. Secure set screws.
7. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Rocker Assembly

---

55. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust rocker assembly to carry the type head to and from the platen so that all characters print clearly.

TOOLS AND EQUIPMENT

1/8" flat-blade screwdriver
Spring hook
Mainspring scale
Bristol wrench
Electric typewriter

PERFORMANCE GUIDE

1. With rocker assembly removed, replace and adjust same.
2. Install rocker shaft.
3. Install "C" clip on right side of rocker shaft.
4. Install rocker shaft set screw.
5. Install the depression control on velocity plate.
6. Install the rotate pulley and spring.
7. Install striker, if present.
8. Install gearless tilt pulley.
9. Install tilt tape.
10. Correct rotate tape and adjust spring tension
11. Install card holder bracket.
12. Install ribbon mechanism and adjust to factory standards by service manual.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Rotate Arm

---

56. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust rotate arm so that the typehead is in the correct position for printing the desired character or symbol.

TOOLS AND EQUIPMENT

Screwdriver
Spring scale
Hooverometer
Spring hook
Duck bill pliers
Electric typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Measure rotate spring tension.
3. Check rotate selector latches.
4. Adjust rotate arm vertical to side frame.
5. Check preliminary typehead homing.
6. Align balance lever.
7. Obtain proper rotate arm motion.
8. Complete eccentric stud adjustment.
9. Check ratio change adjustment (paddle).
10. Advance or retard print shaft timing.
11. Check shift arm motion.
12. Give final check (WORMT).
13. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Rotation Spring Tension

---

57. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust rotation (damper) spring tension so that all characters and symbols print clearly.

TOOLS AND EQUIPMENT

Spring hook
Small blade screwdriver
Screwdriver
Electric typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Measure spring tension.
3. Adjust spring tension.
4. Check wear compensator.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Segment Lock Arm

---

58. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust segment lock arm to lock segment up in place securely.

TOOLS AND EQUIPMENT

T-bender
Socket wrench
Small blade screwdriver
Duck bill pliers
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Adjust for sufficient play between shift lock and shift lock plate.
3. Position shift lock eccentric.
4. Check spring tension.
5. Form shift lock link for proper travel.
6. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Shift Lock Key

---

59. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust shift lock key to lock segment down completely.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Manual typewriter

PERFORMANCE GUIDE

1. Level shift key.
2. Align bottom of capital letters.
3. Check spring tension (rebounding).

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Shift Mechanism

---

60. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust shift mechanism to move segment up and down smoothly.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
T-bender
Socket wrench
Screwdriver
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Adjust for side play.
3. Adjust for sufficient play between shift lock and shift lock plate.
4. Position shift lock eccentric.
5. Check spring tension.
6. Form shift lock line for proper travel.
7. Level shift key.
8. Align bottom of capital letters.
9. Check rebounding.
10. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Space Bar Mechanism

---

61. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust the space bar mechanism to move the carriage one space to the left without hesitation.

TOOLS AND EQUIPMENT

T-bender
Small blade screwdriver
Duck bill pliers
Spring hook
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position space bar height.
3. Form space bar rear link.
4. Check clearance.
5. Secure proper spring tension.
6. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Tabulator Clear Roll

---

62. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust tabulator clear roll to clear all set tabs uniformly.

TOOLS AND EQUIPMENT

T-bender
Screwdriver
Duck bill pliers
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Form tab stop release link.
3. Eliminate binds.
4. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Tabulator Components

---

63. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust tabulator components to allow the operator to move the carriage to a set tab manually.

TOOLS AND EQUIPMENT

Small blade screwdriver
Spring hook
Duck bill pliers
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Form rack lift lever assembly.
3. Form lift arm.
4. Adjust tab blade.
5. Form parts for clearance between tab, finger, and tab stop.
6. Adjust tab brake.
7. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Adjust Universal Bar

---

64. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust universal bar to pivot freely.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Manual typewriter

PERFORMANCE GUIDE

1. Face bottom of machine.
2. Eliminate binds.
3. Align left and right type bars to contact universal bar.
4. Align center and two outside type bars to contact universal bar.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Align Carriage Rail

---

65. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, align the carriage rail so the carriage moves from left to right evenly and smoothly.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position bottom rail to front or rear.
3. Parallel bottom rail.
4. Set spring barrel tension.
5. Check ring and cylinder.
6. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Align Rotate Latches

---

67. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust rotate latches so that all positive characters on the type element operate.

TOOLS AND EQUIPMENT

Bristol screwdriver
Electric typewriter manual
Electric typewriter
T-bender

PERFORMANCE GUIDE

1. Remove necessary covers.
2. Time print shaft.
3. Adjust rotate selector latches.
4. Check and adjust rotate titlt tape.
5. Replace covers.
6. Check for split characters.
7. Check total.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Align Type Heads (Bars)

---

68. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, align type heads (bars) so all the characters strike on the same writing line legibly and are aligned.

TOOLS AND EQUIPMENT

Soldering gauge
Solder
S-5 offset pliers
S-6 type bar bender
S-7 type bar mauler
S-9 type cutting pliers
S-383 type wrench
Manual typewriter

PERFORMANCE GUIDE

1. Remove top cover.
2. Set up type gauge.
3. Align type guide.
4. Obtain individual ring and cylinder.
5. Compare impressions.
6. Center the character.
7. Raise or lower character.
8. Position character vertical.
9. Position character parallel.
10. Check overall impression.
11. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Chemically Clean the Typewriter

---

69. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, chemically clean the typewriter so that all grease, oil, and old ink is removed.

TOOLS AND EQUIPMENT

Cleaning tank
Hot water supply
Air supply
Drying oven
Oil tank
Tool kit
Training manual for standard typewriters
Manual typewriter

PERFORMANCE GUIDE

1. Remove all covers and rubber parts.
2. Inspect all panels.
3. Pick segment.
4. Remove dust.
5. Wash machine.
6. Clean panels and rubber parts.
7. Rinse machine.
8. Blow out water and allow to dry.
9. Place in oil.
10. Drain and dry.
11. Clean all rubber with rubber cleaner.
12. Replace rubber parts.
13. Complete necessary adjustments.
14. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Clean Typewriter in Customer's Office

---

70. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, clean typewriter in customer's office so that all dust and dirt are removed.

TOOLS AND EQUIPMENT

Small air gun
Cleaner kit
Tool kit
Typewriter

PERFORMANCE GUIDE

1. Inspect machine.
2. Remove covers and panels.
3. Remove dirt and dust.
4. Complete necessary adjustments.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Backspace Mechanism

---

71. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form backspace mechanism so that when the key is depressed, the backspace mechanism moves back one space.

TOOLS AND EQUIPMENT

T-bender
Duck bill pliers
IES-148
Screwdriver
Manual typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Form backspace pawl guide.
3. Position backspace key lever.
4. Form backspace key lever extension.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Bent Cover Plates

---

72. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form bent cover plates to original shape.

TOOLS AND EQUIPMENT

Ball pien hammer
Metal block
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove cover plates.
2. Form bent plates.
3. Replace cover plates.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Bent Margin Parts

---

73. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form bent margin parts so margins move with a snappy action and free of binds.

TOOLS AND EQUIPMENT

T-bender
Duck bill pliers
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove carriage covers.
2. Remove margin levers left and right.
3. Form margin bail extension.
4. Form line lock lever.
5. Align line lock crank link.
6. Adjust line lock link.
7. Position space bar and universal bar extension.
8. Form margin release link.
9. Replace margin levers left and right.
10. Replace carriage covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Bent Print (Impression) Mechanism Parts

---

74. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form bent print (impression) mechanism parts so typewriter prints legibly and clear with no blurred characters.

TOOLS AND EQUIPMENT

T-bender
Duck bill pliers
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove top plate cover.
2. Align "q" and "p" in lower case.
3. Form type bars left to right.
4. Form type bars up or down.
5. Replace plate cover.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Bent Ribbon Feed Parts

---

75. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form bent ribbon feed parts so that the ribbon feeds smoothly without binds.

TOOLS AND EQUIPMENT

T-bender
Duck bill pliers
Screwdriver
S-39 tool
IES-143 tool
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position ribbon vibrator.
3. Adjust card scales.
4. Align vibrator arm.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Bent Space Bar Mechanism

---

76. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form bent space bar mechanism parts to restore space carriage to original condition.

TOOLS AND EQUIPMENT

T-bender
Duck bill pliers
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position space bar buffer.
3. Form space bar rear link.
4. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Bent Typewriter Frame

---

77. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form bent typewriter frame to restore it to original shape.

TOOLS AND EQUIPMENT

Screwdriver
T-bender
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Check for bent frame.
2. Form where any bent members exist.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Line Lock Parts

---

78. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form line lock parts to lock out the keyboard automatically.

TOOLS AND EQUIPMENT

T-bender
Duck bill pliers
Small screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position line lock lever.
3. Form line lock crank link.
4. Form line lock link.
5. Align line lock ends.
6. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Tabulator Clear Roll

---

79. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form tabulator clear roll to clear tabs completely.

TOOLS AND EQUIPMENT

T-bender
Duck bill pliers
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Form tab stop release link.
3. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Form Tabulator Set Key Components

---

80. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, form tabulator set key components to set tabs so that tabs hold firmly and do not skip when operated.

TOOLS AND EQUIPMENT

T-bender
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Form tab extension.
3. Position tab set arm.
4. Align tab set key stem crank.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Inspect Typewriter for Periodical Maintenance

---

81. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, inspect typewriter for periodical maintenance so that all machine defects, misalignments, or broken parts are identified and reported.

TOOLS AND EQUIPMENT

Screwdriver
Small brush
Small grease gun
Dust cloth
Rubber cleaning fluid
Metal cleaning solution
Typewriter

PERFORMANCE GUIDE

1. Remove cover plates.
2. Check type bars for free fall.
3. Make functional check on tabulator, backspacer, line space lever, space bar, spacing, and printing.
4. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Install New or Reconditioned Typewriters

---

82. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, install new or reconditioned typewriter so that the typewriter is secured and does not shake or vibrate when operated.

TOOLS AND EQUIPMENT

Drill
Screwdriver
Adjustable wrench
Fastening bolts
Typewriter

PERFORMANCE GUIDE

1. Position typewriter on desk or table in location to be installed.
2. Mark drill points for drilling desk or table.
3. Drill holes.
4. Install bolts into typewriter through drilled holes.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Lubricate the Typewriter

---

83. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, lubricate the typewriter so that it functions without binds.

TOOLS AND EQUIPMENT

#150 oil
Oil can
Typewriter grease
Grease gun
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Lubricate all moving parts to factory standards.
3. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Paint and Refinish Typewriter

---

84. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, paint and refinish typewriter to like-new condition.

TOOLS AND EQUIPMENT

Sand paper
Spray paint
Tape
"Lacquer-Stik"
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Prepare covers and case for painting.
3. Apply proper coats of paint.
4. Condition scales.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Perform Fine Alignment Adjustments

---

85. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, perform fine alignment adjustments so all letters print uniformly.

TOOLS AND EQUIPMENT

S-221 soldering gauge
Solder
S-6 form pliers
S-30 wrench
S-5 offset pliers
S-7 type bar mauler
S-9 type cutting pliers
S-383 type wrench
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Center character.
3. Raise or lower character.
4. Adjust for an even impression.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Perform Locator Adjustments

---

86. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, perform locator adjustments so margin stop latches drop into the teeth of the margin rack completely.

TOOLS AND EQUIPMENT

Small blade screwdriver
#2980-50200 locator socket wrench
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position left margin banking screw.
3. Check mesh of margin stop latch tooth.
4. Secure margin locator screw.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Perform "Motion" Adjustments

---

87. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, perform "motion" adjustment so lower case letters print on the writing line evenly with the upper case letters.

TOOLS AND EQUIPMENT

S-187 motion stop wrench
Typewriter

PERFORMANCE GUIDE

1. Align lower segment stops.
2. Measure pressure of segment stops.
3. Turn adjusting nuts to raise or lower the print.
4. Check for correct operation.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Perform "On-Feet" Adjustments

88. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, perform "on-feet" adjustments so all upper case characters (top and bottom of character) have even impression.

TOOLS AND EQUIPMENT

S-187 motion stop wrench
Typewriter

PERFORMANCE GUIDE

1. Align upper segment stops.
2. Measure pressure of segment stops.
3. Turn the adjusting nut to raise or lower the print to correct position.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Perform "Over and Under" Banking Adjustments

---

89. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, perform "over and under" banking adjustments so, with pressure applied to center stop, the escapement pinion pawl drops between two pinion teeth.

TOOLS AND EQUIPMENT

Thin-blade screwdriver
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position left margin banking screw.
3. Measure spring tension.
4. Set proper pressure on margin locator.
5. Eliminate binds in the margins.
6. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Prepare New Typewriter for Sale

---

90. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, prepare the new typewriter for sale so that all functions operate to factory specifications.

TOOLS AND EQUIPMENT

Boxed typewriter
Screwdriver
Scissors or blade
Polish
Cleaning towel

PERFORMANCE GUIDE

1. Unbox new machine.
2. Give typewriter functional check:
   a. Each key
   b. Tabulator
   c. Backspacer
   d. Space bar
   e. Ribbon reverse
   f. Spacing
   g. Printing
3. Polish machine.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Bichrome Mechanism

---

91. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace the bichrome mechanism to lift ribbon to the correct height.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position vibrator in place.
3. Eliminate binds in the vibrator.
4. Install cotter pin.
5. Form cotter pin.
6. Position vibrator arm screw.
7. Insert vibrator arm screw.
8. Connect spring.
9. Eliminate binds.
10. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Broken Starwheel

92. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace broken starwheel to space carriage from right to left evenly.

TOOLS AND EQUIPMENT

S-349 escapement wheel nut wrench
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers and carriage.
2. Remove tab lift lever assembly.
3. Take off escapement wheel nut.
4. Remove broken part.
5. Select proper pitch.
6. Insert new part.
7. Check direction of pinion teeth.
8. Tighten escapement nut.
9. Install tab lift lever assembly.
10. Eliminate binds.
11. Replace carriage and covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Carriage Bearings and Pinions

---

93. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace carriage bearings and pinions so carriage rolls smoothly.

TOOLS AND EQUIPMENT

Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Disconnect draw band.
3. Position ball bearings.
4. Check bevel edge of pinion.
5. Place pinion.
6. Secure carriage clamps.
7. Eliminate binds.
8. Connect draw band.
9. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Carriage Cord and Drawband

---

94. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace the carriage cord to pull the carriage completely to the left.

TOOLS AND EQUIPMENT

Spring hook
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Select proper length drawband.
3. Connect to spring drum.
4. Guide band under carriage.
5. Hook to right end of carriage.
6. Set proper tension.
7. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Carriage Mainspring

---

95. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace the carriage mainspring to pull the carriage across smoothly.

TOOLS AND EQUIPMENT

Tension scale
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position backspace pawl.
3. Connect spring.
4. Install backspace pawl lift lever.
5. Position spring barrel.
6. Align worn gear.
7. Tighten set screws.
8. Set required tension.
9. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Carriage Rail

---

96. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace carriage rail so carriage is free of binds and fits snugly with no excess play or shaking.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position bottom rail.
3. Install bell hammer.
4. Connect spring.
5. Position tab finger and link.
6. Check back rest binding screw.
7. Secure tab set arm parts.
8. Connect space bar link and bichrome link.
9. Hook spring.
10. Align bottom rail to front or rear.
11. Tighten all bottom rail screws.
12. Check smoothness of carriage.
13. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Carriage Release

---

97. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace the carriage release so that the carriage moves without binding.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Spring hook
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Obtain proper pitch rack.
3. Position feed rack bail.
4. Install bearing nuts.
5. Tighten eccentric screws.
6. Connect bail springs.
7. Eliminate binds.
8. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Carrier Return Cord

---

98. PERFORMANCE OBJECTIVE

Given the equipment listed, replace carrier return cord to pull carrier across completely.

TOOLS AND EQUIPMENT

Electric typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Attach carrier return cord to drum end.
3. Thread cord around pulleys.
4. Hook end to carrier hook.
5. Set proper tension.
6. Replace covers.

NOTE: See the typewriter manual if this sequence is not correct for your typewriter.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Feed Rolls

---

99. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace feed rolls so paper feeds uniformly after each carriage return.

TOOLS AND EQUIPMENT

Small blade screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove platen and paper pan.
2. Insert new rollers on shaft.
3. Position feed rollers.
4. Check spring tension.
5. Replace paper pan and platen.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Line Lock Parts

---

100. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace line lock parts to lock out the keyboard automatically.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Insert links.
3. Check spring hookup.
4. Snug up screws.
5. Eliminate binds.
6. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Margin Bails

---

101. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace margin bails so margins move freely and smoothly.

TOOLS AND EQUIPMENT

Screwdriver
Spring hook
Needle nose pliers
Typewriter

PERFORMANCE GUIDE

1. Remove carriage covers.
2. Place margin bails on fixed fulcrum screws.
3. Install fulcrum screws.
4. Position spring washer.
5. Secure left margin bail lever.
6. Install retainer.
7. Connect spring.
8. Secure right margin bail lever.
9. Connect spring.
10. Eliminate binds.
11. Replace carriage covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Motor

---

102. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace the motor so machine runs smoothly and silently.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Allen wrench
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Secure motor clamps.
3. Connect wires.
4. Align belts.
5. Set tension.
6. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Motor Condenser

---

103. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace the motor condenser so that the motor starts and functions normally.

TOOLS AND EQUIPMENT

Manual for electric typewriter with motor condenser
Screwdriver
Electric typewriter with motor condenser

PERFORMANCE GUIDE

1. Take off back cover.
2. Loosen condenser clamp screw.
3. Remove condenser.
4. Replace with new condenser.
5. Check for proper hookup.
6. Replace condenser clamp and screw.
7. Close up back.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Motor Switch

---

104. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace motor switch to turn motor on and off.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position switch.
3. Connect links.
4. Hook up wires.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Rotate Tapes

105. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace the rotate tape to rotate type element to the key position selected by the operator.

TOOLS AND EQUIPMENT

Screwdriver
Spring hook
Electric typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Select correct length tape.
3. Wind rotate spring to proper tension.
4. Attach tape to rotate pulley.
5. Place around rotate arm.
6. Position around shift arm.
7. Fasten to carrier screw.
8. Set for proper adjustment.
9. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Shift Lock Latch

106. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace shift lock latch to lock segment down and remain in locked position while typing upper-case characters.

TOOLS AND EQUIPMENT

S-59KM wrench
Screwdriver
Duck bill pliers
Spring hook
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Position lock latch.
3. Align shaft in slot.
4. Connect spring.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Shift Mechanism Ball-Bearings

107. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace shift mechanism ball-bearings so segment moves up and down smoothly.

TOOLS AND EQUIPMENT

Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Remove old bearings.
3. Place ball bearings in race way.
4. Position race way in slots.
5. Secure locking screws.
6. Eliminate binds.
7. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Shift Mechanism Linkage

---

108. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace the shift mechanism linkage so that segment operates up and down.

TOOLS AND EQUIPMENT

Screwdriver
T-bender
Duck bill pliers
Spring hook
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Remove old link.
3. Position link.
4. Secure each end of link.
5. Attach spring.
6. Eliminate binds.
7. Replace covers.
8. Check all shift adjustments.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Shift Mechanism Spring

---

109. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace shift mechanism spring to pull the segment up completely.

TOOLS AND EQUIPMENT

Spring hook
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove damaged shift mechanism spring.
2. Attach springs.
3. Eliminate binds.
4. Check for correct operation.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Tilt Tape

---

110. PERFORMANCE OBJECTIVE

Given equipment listed, replace the tilt tape to element so that all selected characters print when the keys are depressed.

TOOLS AND EQUIPMENT

Electric typewriter

PERFORMANCE GUIDE

1. Secure proper length tilt tape.
2. Remove cover plate.
3. Remove typing element.
4. Remove old tilt tape and tilt spring.
5. Hook end of tape to tape pulley.
6. Loop the tilt tape around tilt arm pulley.
7. Loop tilt tape around right tape pulley.
8. Hook tilt tape on locking screw.
9. Check for tilt tape binds.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Type Bar Links

---

111. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace type bar links so that when the type bars are thrown they contact the platen and make a legible impression on the paper.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove top cover.
2. Remove damaged type bar links.
3. Hook up link on type bar.
4. Position type bar in segment slot.
5. Insert segment wire.
6. Eliminate binds.
7. Replace top cover.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Replace Worn Backspace Pawl

112. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace the worn backspace pawl so carriage will move one space to the right smoothly.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Spring hook
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Remove damaged pawls.
3. Position backspace pawl.
4. Connect spring.
5. Secure screw and nut.
6. Eliminate binds.
7. Replace covers.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Rethread Damaged Parts

---

113. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, rethread damaged parts so that the parts are restored to original operation.

TOOLS AND EQUIPMENT

Threading kit
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Obtain proper thread.
2. Remove damaged part.
3. Thread part.
4. Replace part.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Solder Type Heads (Bars)

---

114. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, solder type heads (bars) so they print with a legible impression.and are aligned to manufacturer's specifications.

TOOLS AND EQUIPMENT

Type gauge - S-221
Solder
Sand paper
Torch
Typewriter

PERFORMANCE GUIDE

1. Clean type gauge and type bar.
2. Insert type bar in gauge.
3. Position type gauge.
4. Heat type bar and type.
5. Apply solder.
6. Let type bar cool off.
7. Remove type bar from gauge.
8. Clean up loose solder or debris.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Solder or Straighten Carriage Release

115. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, solder or straighten the carriage release to release carriage completely when the carriage release is operated.

TOOLS AND EQUIPMENT

Silver solder
Torch
Duck bill pliers
Screwdriver
Typewriter

PERFORMANCE GUIDE

1. Remove carriage covers.
2. Form carriage release.
3. Silver solder release.
4. Check for binds.
5. Replace carriage cover.

Duty: MAINTAINING AND REPAIRING TYPEWRITERS

Task: Tighten Left Margin Center Post

---

116. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, tighten the left margin center post so that there is no looseness or left to right shake and no binding when the margin release key is depressed.

TOOLS AND EQUIPMENT

Screwdriver
Duck bill pliers
Typewriter

PERFORMANCE GUIDE

1. Remove covers.
2. Secure screws.
3. Limit side play.
4. Eliminate binds.
5. Replace covers.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Adjust Motor Drive Assembly

---

117. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust the motor drive assembly so that the motor pulley aligns to position of clutch, and belt does not slip or bind.

TOOLS AND EQUIPMENT

Phillips head screwdriver
Set of open-end wrenches
Duplicating machine

PERFORMANCE GUIDE

1. Visually check for proper alignment of motor-to-clutch belt.
2. Loosen motor mounting screws.
3. Position motor for correct belt tension and alignment.
4. Refasten mounting screws.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Adjust Paper Feed Mechanism

---

118. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust paper feed mechanism so that the paper feeds through the machine without wrinkling or 'skip' feeding. The image must be centered evenly on the paper.

TOOLS AND EQUIPMENT

Phillips head screwdriver
Set of Allen wrenches
Can of oil (aerosol spray)
Duplicating machine

PERFORMANCE GUIDE

1. Remove feed roller and pressure roller.
2. Inspect feed roller.
3. Inspect pressure roller for flat spots.
4. Replace feed roller and pressure roller.
5. Lubricate bearings on both rollers.
6. Check pressure roller for positive pressure on drum.
7. Loosen Allen screws on pressure control shaft. Turn shaft for roller to drum contact.
8. Tighten Allen screws.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Adjust Print Control Mechanism

---

119. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, adjust print control mechanism so that the fluid is distributed evenly across paper.

TOOLS AND EQUIPMENT

Phillips screwdriver
Allen wrenches
Sand paper
Hat pin
Duplicating machine

PERFORMANCE GUIDE

1. Remove side covers.
2. Remove any dry fluid or paper lint buildup.
3. Clean small holes in spray tube.
4. Replace worn wick in wick holder.
5. Level machine from side to side.
6. Check pressure roller for positive pressure on drum.
7. Replace side covers.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Align the Cylinder

120. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, align the cylinder so that it is possible to install and remove the paper masters, and the image is aligned on the paper.

TOOLS AND EQUIPMENT

Phillips screwdriver
Duplicating machine

PERFORMANCE GUIDE

1. Remove side cover.
2. Loosen screws on cam behind drive pulley.
3. Adjust cam.
4. Tighten screws.
5. Replace cover.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Clean the Cylinder

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121. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, clean the cylinder so that the back side of copy is free of ink or dust.

TOOLS AND EQUIPMENT

Cleaning fluid
Rags
Duplicating machine

PERFORMANCE GUIDE

1. Start the machine running; then start the drum turning.
2. Dampen a rag with cleaning fluid.
3. As drum turns, apply pressure to drum with damp rag.
4. Wipe dry with clean rag.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Clean the Duplicator

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122. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, clean the duplicator so that it will produce copies free of smudges.

TOOLS AND EQUIPMENT

Cleaning rags
Cleaning fluid
Duplicating machine

PERFORMANCE GUIDE

1. Clean drum.
2. Clean feed and pressure rollers.
3. Clean spray tube.
4. Replace wick.
5. Clean covers and feed tray.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Install Duplicators

---

123. PERFORMANCE OBJECTIVE

Given the equipment listed, install duplicator so that it produces clear and clean copies.

TOOLS AND EQUIPMENT

Operator's manual
Duplicating machine

PERFORMANCE GUIDE

1. Place the duplicator in a convenient location.
2. Level the machine.
3. Check the machine for proper operation.
4. Examine copies.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Lubricate Duplicator

---

124. PERFORMANCE OBJECTIVE

Given the equipment listed, lubricate duplicator so that all parts operate without binding.

TOOLS AND EQUIPMENT

Aerosol spray oil
Grease
Duplicating machine

PERFORMANCE GUIDE

1. Spray bearings, bushings, and other parts subject to friction with spray oil.
2. Grease cams and other parts that oil will run off of.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Perform Operational Checks

---

125. PERFORMANCE OBJECTIVE

Given the equipment listed, perform operational checks so that the duplicator functions to original specifications.

TOOLS AND EQUIPMENT

Master copy
Paper
Duplicating machine

PERFORMANCE GUIDE

1. Prime machine.
2. Load paper.
3. Install new master.
4. Run copies for inspection.
5. Check copies.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Replace Broken Paper Feed Parts

---

126. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace broken paper feed parts so that the duplicator feeds without skipping or wrinkling the paper.

TOOLS AND EQUIPMENT

Standard tool kit
Duplicator feed parts
Duplicating machine

PERFORMANCE GUIDE

1. Remove feed rollers shaft.
2. Slide off feed wheels.
3. Install new wheels.
4. Replace feed wheels shaft.
5. Release clamp under cylinder.
6. Remove and install rollers.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Replace Clutch Pulleys

---

127. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace clutch pulleys so that they feed without slipping.

TOOLS AND EQUIPMENT

"C" clip pliers
Phillips screwdriver
Duplicating machine

PERFORMANCE GUIDE

1. Remove side covers.
2. Remove "C" clips holding clutches.
3. Replace with new or repaired clutches.
4. Replace side covers.

Duty: MAINTAINING AND REPAIRING DUPLICATOR

Task: Replace Motor Assembly

---

128. PERFORMANCE OBJECTIVE

Given the tools and equipment listed, replace motor assembly so that motor functions as original equipment.

TOOLS AND EQUIPMENT

Phillips screwdriver
Straight screwdriver
Duplicating machine

PERFORMANCE GUIDE

1. Remove side covers.
2. Remove clamps on both ends of the motor.
3. Remove drive belt.
4. Disconnect wires from terminal blocks.
5. Replace the motor.
6. Replace the drive belt.
7. Check operation of machine.
8. Replace covers.

APPENDIXES

APPENDIX A

TOOLS AND EQUIPMENT

EQUIPMENT BY PERCENTAGE RATING

Equipment Number	Equipment Description	Percentage Using	Number Using
70	Pliers, Duck Bill, 8" Overall	98	49
2	Allen Driver Kit	90	45
4	Bench Grinder	88	44
61	Light, Bench with SHSDE	88	44
47	Hacksaw, 8" to 12", 3¼" Stock, 3/16" x 3/16" Depth	86	43
69	Pliers, Diagonal cutting, 5 1/8" Overall	84	42
117	Steel Work Benches	84	42
22	Cleaning Tank	82	41
25	Cutters, Parallel Jaw 6½"	82	41
62	Magnetizer - Demagnetizer, 110 v, AC/DC Complete	82	41
74	Pliers, Keyring Detaching with Shift Plate	82	41
92	Screwdriver, 7/32 x 6½" Blade, 7/32 Bit	82	41
142	Wrench, Open End, Two 3/8" Openings, 3½" Overall	82	41
8	Block, Combination Bench	80	40
64	Oil Can, Bench 4 oz.	80	40
84	Punch, 5/8" x 3/16", 16" Overall	80	40
91	Screwdriver 1/8" x 1/8" Blade 5/32" Bit	80	40
103	Screwdriver, Jewler's Blades, .025, .040, .055, .070, .080	80	40
121	Testmeter	80	40
18	Chair, Adjustable Posture	78	39
68	Picks, Segmented, for Cleaning Slots in Segment	78	39
9	Brush, Cleaning 1 3/4" Bristles, 1¼" Dia., 10½ Overall	76	38
34	File, 6" x ¼", 0 - Cut	76	38
36	File, Round, 6" 0 - Cut	76	38
54	Hose, Air 25" Length	76	38
120	Tank, Bernz/O-Matic	76	38
127	Twister, Paper Pan	76	38
39	Gage, Geller, 9 Leaves, .003, .004, .005, .006, .008, .010	74	37
71	Pliers, Key Lever Peening	74	37
125	Turntable, Ball Bearing with Locking Top	74	37

Equipment Number	Equipment Description	Percentage Using	Number Using
131	Workbench, 24" x 30" with Typewriter Storage	74	37
6	Bender, Key Lever	72	36
42	Gage, Type Soldering	72	36
89	Rule, Tape, 6 Ft.	72	36
112	Solder Station	72	36
140	Wrench, Open End, 3/16" x 5/15" Openings	72	36
143	Wrench, 3/16", 1/4" Openings, 5 11/16" Overall	72	36
43	Goggles, Clear, Shatter Proof Lens, Adjustable Replaceable LE	70	35
48	Hammer, Ball Peen, Size #0000, 4 oz. 11½ Overall	70	35
93	Screwdriver, 8" Blade, 1/8" Atock, 5/32" Bit	70	35
104	Screwdriver, Phillips #1, 2½" Bit Length	70	35
149	Wrench, Socket, 7/32" Hex Opening, 3 5/16" Overall	70	35
53	Hex Key Set	68	34
90	Screwdriver, Bristol, Blade 4½", Shank 1/16"	68	34
141	Wrench, Open End Two 7/16" Openings, 5 3/16" Overall	68	34
29	Drill Set, Mores Straight Shank	66	33
82	Pliers, Wiring, Duck Billed Jaws, 7 7/8" Overall	66	33
85	Punch, Centering, 1/4", 4" Overall	66	33
105	Screwdriver, Phillips #2, 3½" Bit Length	66	33
116	Square, Combination, Graduate Inches, 8ths, 10ths, 32ths, 12	66	33
148	Wrench, Open End, Two 5/16" Openings, 3 7/8" Overall	66	33
12	Brush, Scrubbing, 1" Bristles, 1" Dia. 5" Long, 10½" Over	64	32
23	Clock, Electric	64	32
30	Emery Stone, Coarse and Fine Grit, 6" x 2" x 1"	64	32
113	Solder, 1/16" Diam., ½ Pound	64	32
119	Straight Edge, Graduated Steel, Non Beveled, 3/16" x 18"	64	32
139	Wrench, Open End, Two 13/16" Openings, 4¼" Overall	64	32
50	Hammer, Mechanics 4 oz.	62	31
95	Screwdriver, Shank 7/32", Blade 6½"	62	31
110	Snips, 12¼" Overall	62	31

Equipment Number	Equipment Description	Percentage Using	Number Using
147	Wrench, Open End, Two ¼" Openings, 3 7/8" Overall	62	31
5	Bender, Actuating Arm 9" Overall	60	30
38	File, 4 Drawer Letter Size	60	30
63	Nozzel, Straight Extension, 6" Air Consumption 14 CFW at 80	60	30
144	Wrench, Open End, ¼", 3/8" Openings, 3 3/4" Overall	60	30
146	Wrench, Open End, 9/64", 7/32", Openings, 3 5/8" Overall	60	30
37	File, Segment, 4", 0 - Cut, 20 Gage	58	29
83	Poly Bottles	58	29
86	Punch, Pin Driving ¼", 1/16", 4" Overall	58	29
150	Wrench, Socket, ¼" Hex, Overall	58	29
51	Heater, Gas Water, 30 Gal. Capacity	56	28
80	Pliers, Standard, 665 #57 Smith Corona for 70Del 1A, Side AL	56	28
106	Screwdriver, Phillips #3, 5½" Bit Length	56	28
135	Wrench, Combination Screwdriver 1/8" x ¼" Bits, 6 3/8" OVE	56	28
136	Wrench, Escapement, ¼", 9/32", Openings 3 7/8" Overall	56	28
77	Pliers, 3 Prong 6 13/16" Overall Length	54	27
132	Work Tables, Individual	54	27
1	Aligner, Side	52	26
3	Atomizer	52	26
7	Bender, Ribbon Vibrator, 5 3/4" Overall	52	26
11	Brush, Enamel, 3/4" Bristles, 3/4" Wide, 6 3/4" Overall	52	26
41	Gage, Soldering	52	26
46	Gun, Suction Spray	52	26
59	Knife, Electricians	52	26
137	Wrench, Escapement, 1/8" Opening, 4 1/8" Overall	52	26
10	Brush, Cleaning, 1 3/4" Bristles, 3/4" Wide, 16" Overall	50	25
24	Cold Chisel, ½", ¼", 6 3/4" Overall	50	25
35	File, Pillar, 6" x ½", 0 - Cut	50	25
78	Pliers, Side Aligning, 7 1/8" Overall Length	50	25
138	Wrench, Open End, Noiseless, 5/32" x 3/16"	50	25
145	Wrench, Open End, 9/64" Openings, 3 5/8" Overall	50	25
52	Heat Sink	48	24
94	Screwdriver, Shank 5/16" Blade 6"	48	24
100	Screwdriver, Combination, ¼" x 3/8", 9 3/4" Overall	48	24

Equipment Number	Equipment Description	Percentage Using	Number Using
107	Screwdriver, Phillips #4, 5½" Bit Length	48	24
114	Soldering Flux, Paste 2 oz.	48	24
81	Pliers, Wirecutting - Mauler Jaws, 7 7/8" Overall	46	23
101	Screwdriver, Double End Offset, 5/32" Bit	46	23
124	Transformers, Air	46	23
45	Gun, Spray	44	22
56	Icepick, Scribe	44	22
151	Wrench, SO C ET, 7/32" Hex	44	22
152	Wrench, Socket 7/32" Hex Opening, 3 5/8" Overall	44	22
96	Screwdriver, Shank, 5/32", Blade 8"	42	21
102	Screwdriver, Hexagon, Blade 5½" Shank 1/16"	42	21
98	Screwdriver, 3/15" Shank, 6" Blade	40	20
26	Desk, Linoleum Top	38	19
66	Oscilloscope	38	19
76	Pliers, 7" Nineprong	38	19
109	Screw Plate	38	19
14	Brush, 3/8" Bristles, 1 3/4" Dia, 6" Overall	36	18
88	Roller Transfer	36	18
97	Screwdriver, 1/8" Shank, 4½" Blade	36	18
49	Hammer, Claw 16 oz., 13" Overall	34	17
55	Hose, Rubber Covered Air, 12" Length with ¼" NBS ¼	34	17
60	Lathe, ½ HP Motor, 115-230 V - 60 CYC. AD 1725 RPM	34	17
122	Tip, Torch	34	17
133	Wrench, Adjustable, 3/4" Capacity, Head Thickness 13/32" 5 O	34	17
13	Brush, Wire Handles, 3 3/4" Bristles, 1½" Dia., 12" Overall	32	16
15	Brush, 9/16" Bristles, 3/4" Dia., 6" Overall	32	16
44	Gun, Connection Thread ¼", NBS, (M), Air Consumption	32	16
65	Oiler, Capacity 1 Pt., 6" Spout with Twin Tip Vent	32	16
153	Wrench, Socket, Noiseless, 5/16" Hex Opening	32	16
155	Wrench, Toggle, ¼" Hex Slot, 6 7/8" Overall	32	16
17	Calipers, Outside, Spring Nut 8" Overall	30	15
79	Pliers, Slip Joint, 6" Overall	30	15
99	Screwdriver, 3/16" Bit, 6½" Blade	30	15
111	Solder Puller	30	15

Equipment Number	Equipment Description	Percentage Using	Number Using
129	Wheel, Loose Muslin Buffs, 6" Diam. ½" Hole	30	15
154	Wrench, Toggle, 3/16" Hex, ¼" Slot, 6 7/8" Overall	30	15
156	Wrench, Toggle, 3/8" Hex, ¼" Slot Opening, 5 7/8" Overall	30	15
72	Pliers, Keyring Attaching with Plate	28	14
40	Gage, Pickup, Trip	26	13
73	Ers, Keyring Attaching with Plate	26	13
134	Wrench, Aligning 3/64" Slot V Slot, 1/16" to 5/32"	26	13
19	Chair, Side Arm	24	12
28	Drill Press, Bench Model	24	12
32	Extractors, Screw Gage #48 Dia. Small End 3/16"	24	12
126	Tweezers, 4½" Overall	24	12
128	Vise, Swivel Type, 2 Jaws	24	12
31	Extractors, Dia. Small End ¼", Large End 7/16"	22	11
57	Iron, Press-to-Heat	22	11
75	Pliers, Longnose Crescent, 2½" Nose Length, 6" Overall	22	11
118	Storage Cabinet	22	11
130	Wheel, Wire, 33 Gage, 6" Diam., 1" Face with Adapter, ½" Hole	22	11
20	Chalk Board	20	10
21	Circuit Board Holder	20	10
27	Divider, Probes	20	10
16	Calculator, Inch to Metric	18	9
33	Figures, Steel for Metal Stamping	18	9
87	Punch, Starting ⅛, ¼", 6" Overall	18	9
67	Paint Oven, Infra Red	16	8
108	Screwdriver, Shank ¼", Blade 10"	16	8
115	Spray Booth	14	7
58	Kit, Transfer	10	5
123	Tool, Roll, 12½" x 22"	10	5
	TOTAL RESPONDENTS		50

APPENDIX B

STATE-OF-THE-ART LITERATURE

1. A.B. Dick Company. Service Manual Model 310 Offset Duplicator. Chicago: 1974.
   This service manual includes diagrams and step-by-step procedures for repairing this particular model duplicator.

2. _____. Service Manual Model 675 Copier. Chicago: 1968.

3. _____. Service Manual Bond 901 Copier. Chicago: 1974.

4. Alabama State Department of Education. Measurable Objectives Study for Post Secondary Technical Institutes/Technical Colleges (Office-Machine Repair), Vol. I. Montgomery, AL 36104, 1973.
   An excellent course outline, with references, for teaching business machine repair. Included are a set of measureable objectives for each unit.

5. Ames Supply Company. Ames Catalog No. 12. 2537 Curtiss Street, Downers Grove, IL 60515.
   Very thorough lists of equipment, tools, and instruction manuals.

6. _____. History of the Typewriter. 2537 Curtiss Street, Downers Grove, IL 60515, 1975.
   A thorough historical review of the typewriter with emphasis on its development.

7. Bryant, Carl. Electric Typewriters-Remington, I.B.M. Vocational Horizons, Inc., 32-49 Gale Avenue, Long Island City, NJ 11101.
   This volume is a complete textbook for students learning repair on these specific electric typewriters. With a few variations, this text is applicable to most basic courses of instruction on electric typewriters.

8. _____. Manual Typewriters Training Manual. Vocational Horizons, Inc. 32-49 Gale Avenue, Long Island City, NJ 11101.
   An excellent basic textbook for students who are learning office-machine repair. The text on manual typewriters is the basis for nearly all office-machine repair.

9. _____. 10-Key Electric Adding Machine, Remington and Victor, Vocational Horizons, Inc. 32-49 Gale Avenue., Long Island City, NJ 11101.
   A good basic text for learning to repair these adding machines, although somewhat dated.

10. California Development Department. Office-Machine Serviceman. California Occupational Guide, No. 405, Los Angeles, CA, 1973.
A good survey of the occupation of office-machine serviceman. This proved to be most valuable in writing the V-TECS State-of-the-Art Report.

11. Career and Continuing Education Department. Olivetti Electrosumma 72 and Multisumma 22 Repair, Curriculum Office G-361, 450 N. Grand Avenue, Los Angeles, CA 90012, 1974.
An experimental course outline in office-machine repair for the Los Angeles Public School System.

12. _____. Olivetti Tetractys/ Divisumma 24 Mechanical Calculators. Curriculum Office G-361, 450 N. Grand Avenue, Los Angeles, CA 90012, 1972.
An experimental course outline to teach the repair of these particular Olivetti Calculators.

13. _____. Digital Business Machines. Curriculum Office G-361, 450 N. Grand Avenue, Los Angeles, CA 90012, 1975.
Course outline for teaching repair of these machines. Includes references and audio-visual materials.

14. Center for Vocational Education. Abstracts of Instructional Material in Vocational-Technical Education (AIM). The Ohio State University, Columbus, Ohio 43210.
A collection of abstracts of instructional materials in technical education which is published bi-monthly with entries indexed by author and subject. Most of these are on microfiche.

15. _____. Abstracts of Research Materials in Vocational Education, (ARM). The Ohio State University, Columbus, Ohio 43210.
A collection of abstracts of research materials done in the area of vocational-technical education which is published bi-monthly and indexed by author and subject. Most of the entries are available on microfiche.

16. _____. Directory of Task Inventories, Volume I, The Ohio State University, Columbus, Ohio 43210, 1974.
This volume contains abstracts of task inventories, which are listings of activities performed by workers on their jobs.

17. _____. Directory of Task Inventories, Volume II, The Ohio State University, Columbus, Ohio 43210, 1975.
This volume contains abstracts of task inventories, which are listings of activities performed by workers on their jobs.

18. _____. Directory of Task Inventories, Volume III. The Ohio State University, Columbus, Ohio 43210, 1976.
This volume contains abstracts of task inventories which are listings of activities performed by workers on their jobs.

19. Chronicle Guidance Publications. Occupational Brief on Office-Machine Serviceman, Moravia, NY 13118, 1971.
A survey of the office-machine serviceman occupational profession.

20. _____. Occupational Brief on Office Machine Services, Moravia, NY 13118, 1975.
A more recent analysis of the office-machine serviceman trade with updated statistics and new areas of interest.

21. Curriculum Innovations, Inc. Career World Focus; Career World, January, 1976. 501 Lake Forest Avenue, Highwood, IL 60040, pp. 4-16.
A short article describing the current employment status for office-machine repairs, especially computer repairman. Those entering the office-machine repair field will need considerable knowledge of electronics to advance in their employment potential.

22. Department of Trade and Industrial Education. Office-Machine Repair, University of Alabama, University, AL, 1970.
A very comprehensive study guide with space for recording the progress of the student. The guide covers manual typewriters, basic electricity, electric typewriters, and the 10-key electric adding machine.

23. Educational Resources Information Center. (ERIC), National Institute of Education, Office of Dissemination and Resource, Washington, DC.
A computer search of ERIC materials was conducted (see appendix "A" for ERIC descriptors used) through the South Carolina Research Coordinating Unit, Columbia, S. C. Abstracts were printed-out and some proved of value in this state-of-the-art study.

24. Gerrish, Howard H. Exploring Electronics, The Goodheart-Wilcox Co., Inc., South Holland, IL, 1971.
A brief introduction to theory of electricity is followed by an excellent survey of basic electronics and their practical applications.

25. _____. Electricity and Electronics, The Goodheart-Wilcox Co., Inc., South Holland, IL, 1968.
A basic text which generally covers a wide-range of theory, with many examples of practical applications in industry.

26. Guatney, Charles L. Office Machine Repair and Maintenance Workshop Guide, Working Papers available from Charles L. Guatney, Consultant, State Department of Education, Montpelier, VT. 05641.
An outline for a workshop program in Office Machine Repair.

27. Hall, Eugene and Turner, Raymond. An Analysis of the Industrial Mechanics Occupation, Instructional Materials Laboratory - Trade and Industrial Education, The Ohio State University, Columbus, Ohio.
This is primarily of value only since it closely resembles tasks and skills used in office-machine repair.

28. Harris, Murray. Basic Manual for Electric Typewriters, Ames Supply Co., Downers Grove, IL 60515, 1970.
Covers - Royal, Remington, Smith-Corona, Underwood, IBM Selectric, IBM C&D.

29. _____. Basic Training Manual for Standard Typewriters, Ames Supply Co., Downers Grove, IL 60515, 1968.
Covers - Royal, Underwood, Remington, Smith-Corona, Adler, Hermes, and Olympia.

30. I.B.M. I.B.M. Service Manual Models C&D Typewriter, I.B.M. Office Products Division, Old Orchard Road, Armonk, NY, 1971.
An excellent repair manual for I.B.M. electric typewriter types C&D.

31. I.B.M. Service Manual for Selectric and Selectric II Typewriter, I.B.M. Office Products Division Customer Engineering, Old Orchard Road, Armonk, NY, 1975.
A complete service manual for all repairs on the I.B.M. Selectric and Selectric II typewriters. Includes excellent diagrams and nomenclature for these typewriters.

32. Institute for Research. Business Machines and Service as a Career, No. 276, The Institute, 610 South Federal Street, Chicago, IL 60605, 1974.
A very complete description of the career field in business machines sales and repair for prospective incumbents.

33. Jensen Tools. Jensen Tools and Alloys Catalog - 1976, 4117 N. 44th Street, Phoenix, Arizona 85018.
A complete catalog of tools used by the office-machine repairman, including electronic-measuring instruments for more sophisticated equipment.

34. Lehigh University. Occupational Competency Test for Business Machine Maintenance, Developed by Lehigh University for Bureau of Vocational Education, Harrisburg, PA.
A set of 180 questions accompanied by some diagnostic situations for testing the competency of business-machine repairman.

35. Lescarbeau, R. and Fellows, D., A Three-Year High School Program to Train Electro-Technical Technicians for the Business Machine Industries, The Ward Technical Institute, University of Hartford, West Hartford, CT 06117, 1969.
A complete outline for a program in Business Machine Repair including texts, references, and associated curriculum. This would be a good format for setting up training in office-machine repair.

36. Loper, Orla E. and Ahr, Arthur F. Introduction to Electricity and Electronics, Delmar Publishers, Albany, NY, 1968.
A good survey of basic theory of electricity, use of electrical measuring instruments, and electronic components.

37. Magoon, Clinton. Performance Objectives - Office Machine Repair, Vocational-Technical Education, Vermont Department of Education, Montpelier, VT. 05602

A set of very general performance objectives for office-machine repair, although not specific enough for use as V-TECS performance objectives.

38. Melching, William and Bercher, Sidney. Procedures for Constructing and Using Task Inventories, The Center for Vocational and Technical Education, The Ohio State University, 1960 Kenny Road, Columbus, Ohio 43210, March 1973.

This volume is an excellent source for learning how to construct task inventories and analyzing occupational performance. It essentially outlines procedures which have been adopted by V-TECS in analyzing and writing task inventories.

39. Minnesota Instructional Materials Center. Business-Machine Repair Learning Guides, 3300 Century Avenue North, White Bear Lake, MN 55110, 1974.

These guides outline the procedures for a student to follow in repairing various business-machnies. They list tasks along with the terminal performance objectives and quizzes for each step of the objective.

40. National Office Machine Dealers Association. Service Management for Office Machine Dealers, 1510 Jarvis Avenue, Elk Grove, IL 60007, 1975.

41. Nichol, Lowell. An Analysis of the Typewriter Servicing Occupation, Instructional Materials Laboratory - Trade and Industrial Education, The Ohio State University. Columbus, Ohio 43210, 1974.

A thorough duty and task analysis for typewriter repair. Although the format is considerably different than that used by V-TECS catalogs, it offered valuable guidelines in constructing a duty/task inventory.

42. Oregon Board of Education. Industrial Mechanics, Curriculum Guide, Developed by the Division of Community Colleges and Career Education, The Oregon Board of Education, Salem, Oregon 97310.

A section on office-machine servicemen was designed to acquaint individuals with systems as they apply to mechanics, to give background instruction on mechanical equipment and paper supplies, and instruction in diagnostic techniques and procedures.

43. _____. Business Machines Representative, Division of Community Colleges and Career Education, Salem, Oregon 97310, 1974.

44. Pittsburgh Public School System. Typewriting I and II. Course of Study, Pittsburgh, PA, 1970.

Although this is primarily for a course in Office Occupations, it contains a section on minor repairs and a parts list for typewriters.

45. Royal Typewriter Company. Self-Paced Service Training Program-Royal Standard and Electric Typewriter, 150 New Park Avenue, Hartford, CT, 06106.

46. _____. Royal Typewriter Service Manuals: GA 550, 440, 990 and 470, 150 New Park Ave., Hartford, CT 06106.

47. Rutgers University. Office-Machine Serviceman. New Jersey Job Guide No. 59, New Brunswick, NJ 08903.
This guide provides information on the occupation of Office-Machine Serviceman and includes such topics as nature of the work, physical requirements, working conditions, training, opportunities, etc.

48. Sperry-Rand Corporation. Remington Model 100e Electric Typewriter: Instruction Manual, P. O. Box 1000, Blue Bell, PA 19422,1974.

49. _____. Remington Model 100e Electric Typewriter: Adjustment Manual and Accompanying Tape Lecture, P. O. Box 1000, Blue Bell, PA 19422, 1974.

50. _____. Remington Adjustment Manual #AM 270 Calculators, Blue Bell, PA 19422.

51. _____. Remington Calculator Instructional Manual #IM 275 RR, Blue Bell, PA 19422.

52. Seippel, Robert G. Fundamentals of Electricity, American Technical Society, Chicago, IL, 1974.
An excellent survey of the basics of electricity, electronics, controls and computers.

53. Sharp Electronics Corporation. Service Manual-Electronic Calculator #310/320, 10 Keystone Place, Paramus, NJ 07652, 1975.

54. _____. Service Manual-Electronic Desk-Top Calculator - Model EL-122, 10 Keystone Place, Paramus, NJ 07652, 1974.

55. _____. Service Manual-Electronic Calculator - Model CS-523/626, 10 Keystone Place, Paramus, NJ 07652, 1975.

56. _____. Service Manual-Electronic Calculator - Model CS-224/243V, 10 Keystone Place, Paramus, NJ 07652, 1975.

57. Texas Instruments Learning Center. Understanding Solid-State Electronics, Fort Worth, TX 76107, 1972.
A self-teaching course in Basic Semiconductor Theory.

58. U.S. Army Occupational Survey Branch. Curriculum Guide for Office Machine Repair, Department of the Army, 2461 Eisenhower Avenue, Alexandria, VA 22331.

A performance based, criterion-referenced curriculum guide. This guide is really excellent and will be an invaluable aid in developing performance objectives, criterion-referenced measures, and performance guides in the V-TECS catalog. The set of guides contains information on repairing virtually all the office-machines to be included in this V-TECS catalog.

59. U.S. Army Occupational Survey Branch. Task and Duty Lists for Office-Machine Repairman, Department of the Army, 2461 Eisenhower Avenue, Alexandria, Virginia 22331.
These duty and task lists were the most complete and comprehensive ones found, and formed the basis for developing the V-TECS duty and task lists for all varieties of office-machine repair.

60. U.S. Department of Labor. Dictionary of Occupational Titles: Definitions of Terms, Vol. 1, 3rd Ed., U.S. Government Printing Office, Washington, DC.
This volume contains a listing of over 35,000 job titles which are arranged according to job title and accompanying definition.

61. _____. Dictionary of Occupational Titles: Classification and Industry Index, Vol. II, 3rd Ed., U.S. Government Printing Office, Washington, DC.
This volume groups the job titles from Volume I into similar occupational characteristics.

62. U.S. Government Printing Office. Business Machine Servicemen, Occupational Outlook Bulletin, No. 74, Washington, DC 20402.
This bulletin gives a very favorable outlook, supported by statistics, to those interested in pursuing a career in business-machine servicing fields.

63. Wichita Public Schools. Instructor's Guide to Office Machines, Produced by the Wichita Public Schools, Wichita, KS, 1970.
This was valuable as a starting reference point to determine which office-machines are most widely used.

64. Xerox University Microfilms. Dissertation Abstracts International, Ann Arbor, MI.
Abstracts of completed dissertations from 1968 to the present. This did not prove of much value in searching for materials in office-machine repair.

Appendix C

CROSS-REFERENCE TABLE OF DUTIES,
TASKS, AND PERFORMANCE OBJECTIVES

The purpose of this table is to cross-reference changes made since compiling the original task inventory and completing the survey of incumbent workers. The information contained in the Cross-Reference Table is described below. The information is intended primarily for use in computerizing the catalog of performance objectives and performance guides for retrieval by various educational audiences.

1. * By a Task Number indicates a performance objective was not written; however, stanine values appear under the Dictionary of Occupational Titles 4th ed. (DOT) code. (See No. 6 below regarding stanine value(s).)

2. @ By the Cumulative Performance Objective Number indicates that supplementary materials such as a checklist accompanies the performance objective. Example: Cumulative Performance Objective Number 6@.

3. (XXX) With Task Numbers indicate tasks that were combined to generate a performance objective. Example: B10 (B11). All combined tasks must be common to the same DOT code.

4. Divided tasks (sub-tasks) are labeled with an a, b, c, etc. Examples: A02a, A02b. All sub-tasks must be common to the same DOT(s) as the original task.

5. Duties, tasks, and stanine values by DOT to be included in the Cross-Reference Table of Duties, Tasks and Performance Objectives are to be taken from the Task Worksheets.

6. Stanine values are assigned by individual DOTs to indicate the relative amount of time spent performing the tasks which were converted to objectives. Stanine values range from nine (most amount of time spent) to one (least amount of time spent). Percentages of tasks by time spent which correspond to each stanine value are as follows:

Cumulative Percent of Total Tasks		Stanine Values
4.0	(Upper)	9
7.0		8
12.0		7
17.0		6
20.0	(Middle)	5
17.0		4
12.0		3
7.0		2
4.0	(Lower)	1
Total Percent 100.0		

7. Information appearing on the Cross-Reference Table of Duties, Tasks, and Performance Objectives is extensively utilized for keypunching the Header Card needed for storing each performance objective of the Final Catalog onto the computer system.

Code Information

Project Code	2145		
O. E. Code	17.0600		
DOT 1	633.281-030	Office Machine Serviceman - N =	25
DOT 2	633.131-030	Office Machine Foreman - N =	25
		TOTAL RESPONSES	50

CROSS-REFERENCE TABLE OF TASKS AND PERFORMANCE OBJECTIVES

PROJECT CODE 2145

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
A	SUPERVISING AND PLANNING				
	1	Demonstrate office machine repair tasks to personnel	1/13	5	8
	2	Evaluate shop production	2/14	5	8
	3	Evaluate worker performance	3/15	4	9
	* 4	Inspect shop for OSHA safety violations	--	3	8
	5	Inventory supplies and parts	4/16	8	9
	* 6 (A-5)	Inventory tools and equipment	--	5	8
	7	Organize shop layout	5/17	4	8
	8	Orient workers on shop practices	6/18	5	8
	9	Prepare shop budget	7/19	2	8
	*10	Prepare shop maintenance procedures	--	4	8
	11	Prepare work schedules and assignments	8/20	3	9
	12	Process repair work	9/21	9	9
	13	Receive maintenance contract machines	10/22	7	9
	14	Receive new office machines	11/23	9	9
	15	Requisition supplies and parts	12/24	8	8

	TASKS			STANINE VALUES	
DUTY	NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	DOT 1	DOT 2
A		SUPERVISING AND PLANNING (continued)			
	16	Requisition tools and equipment	13/25	6	9
	17	Write shop personnel requirements	14/26	2	8
	18	Write shop repair equipment requirements	15/27	5	7
B		SELLING OFFICE MACHINES AND SERVICES			
	1	Calculate price to charge	16/28	7	8
	2	Calculate repair costs	17/29	8	9
	3	Complete a sales slip	18/30	6	8
	4	Demonstrate office machine operation	19/31	6	8
	* 5	Prepare printed advertising layout	--	4	7
	* 6	Prepare verbal (radio - TV) advertising	--	1	4
	* 7	Prepare visual (posters, store display) advertising layout	--	1	2
	8	Receive office machine for repair	20/32	9	8
	9	Sell new office machines	21/33	5	7
	10	Sell parts	22/34	7	7
	11	Update parts catalogs	23/35	9	7

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
B	SELLING OFFICE MACHINES AND SERVICES (continued)				
	12	Update service manuals	24/36	8	7
C	MAINTAINING AND REPAIRING TYPEWRITERS				
	1	Adjust aligning scales	25/37	7	8
	2	Adjust backspace pawl	26/38	7	7
	3	Adjust bichrome mechanism	27/39	5	5
	4	Adjust carriage clamps	28/40	5	5
	5	Adjust carriage cord tension	29/41	7	5
	6	Adjust carriage return mechanism	30/42	8	6
	7	Adjust carrier return cord	31/43	7	6
	8	Adjust carrier return cord tension	32/44	7	6
	9	Adjust drive mechanism	33/45	7	6
	10	Adjust escapement rack teeth	34/46	6	5
	11	Adjust escapement starwheel	35/47	6	5
	12	Adjust for negative rotation	36/48	6	5
	13	Adjust for positive rotation	37/49	6	5
	14a	Adjust for proper tilt	38/50	5	5

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
C	MAINTAINING AND REPAIRING TYPEWRITERS (continued)				
	14b	Adjust tilt latches	39/51	5	5
	15	Adjust front feed rolls	40/52	5	5
	16	Adjust index mechanism	41/53	5	6
	17	Adjust keyboard selection mechanism	42/54	5	5
	18	Adjust key levers	43/55	6	4
	19	Adjust line lock	44/56	6	6
	20	Adjust line space mechanism	45/57	7	7
	21	Adjust mainspring	46/58	7	6
	22	Adjust margin release	47/59	7	5
	23	Adjust motor belts	48/60	7	6
	24	Adjust motor pulleys	49/61	8	6
	25	Adjust operational control mechanism	50/62	5	7
	26	Adjust print (impression) mechanism	51/63	8	7
	27	Adjust rear feed rolls	52/64	6	6
	28	Adjust ribbon feed mechanism	53/65	8	7
	29	Adjust ribbon reverse control	54/66	8	7
	30	Adjust rocker assembly	55/67	5	5

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
C	MAINTAINING AND REPAIRING TYPEWRITERS (continued)				
	31	Adjust rotate arm	56/68	5	5
	32	Adjust rotation spring tension	57/69	5	5
	33	Adjust segment lock arm	58/70	5	4
	34	Adjust shift lock key	59/71	6	6
	35	Adjust shift mechanism	60/72	7	7
	36	Adjust space bar mechanism	61/73	8	7
	37	Adjust tabulator clear roll	62/74	6	5
	38	Adjust tabulator components	63/75	7	7
	39	Adjust universal bar	64/76	5	5
	40	Align carriage rail	65/77	5	5
	41	Align margin bails	66/78	5	6
	42	Align rotate latches	67/79	5	5
	43	Align type heads (bars)	68/80	8	6
	44	Chemically clean the typewriter	69/81	9	7
	45	Clean typewriter in customer's office	70/82	8	7
	46	Form backspace mechanism	71/83	6	6
	47	Form bent cover plates	72/84	5	4

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DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
C	MAINTAINING AND REPAIRING TYPEWRITERS (continued)				
	48	Form bent margin parts	73/85	6	5
	49	Form bent print (impression) mechanism parts	74/86	6	5
	50	Form bent ribbon feed parts	75/87	6	6
	51	Form bent space bar mechanism	76/88	6	6
	52	Form bent typewriter frame	77/89	5	4
	53	Form line lock parts	78/90	5	6
	54	Form tabulator clear roll	79/91	6	4
	55	Form tabulator set key components	80/92	6	6
	56	Inspect typewriter for periodical maintenance	81/93	9	7
	57	Install new or reconditioned typewriters	82/94	7	6
	58	Lubricate the typewriter	83/95	9	7
	59	Paint and refinish typewriter	84/96	6	6
	60	Perform fine alignment adjustments	85/97	9	7
	61	Perform locator adjustments	86/98	6	6
	62	Perform "motion" adjustments	87/99	7	7
	63	Perform "on-feet" adjustments	88/100	8	6
	64	Perform "over and under" banking adjustments	89/101	7	6

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
C	MAINTAINING AND REPAIRING TYPEWRITERS (continued)				
	65	Prepare new typewriter for sale	90/102	8	7
	66	Replace bichrome mechanism	91/103	6	4
	67	Replace broken star wheel	92/104	7	5
	68	Replace carriage bearings and pinions	93/105	7	5
	69	Replace carriage cord	94/106	7	6
	* 70 (C-99)	Replace carriage drawband	--	7	6
	71	Replace carriage mainspring	95/107	5	5
	72	Replace carriage rail	96/108	5	4
	73	Replace carriage release	97/109	6	5
	74	Replace carrier return cord	98/110	6	7
	75	Replace feed rolls	99/111	6	6
	76	Replace line lock parts	100/112	6	4
	77	Replace margin bails	101/113	6	5
	78	Replace motor	102/114	6	4
	79	Replace motor condenser	103/115	5	5
	80	Replace motor switch	104/116	7	6

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
C		MAINTAINING AND REPAIRING TYPEWRITERS (continued)			
	81	Replace rotate tapes	105/117	6	7
	82	Replace shift lock latch	106/118	5	5
	83	Replace shift mechanism ball-bearings	107/119	5	5
	84	Replace shift mechanism linkage	108/120	5	5
	85	Replace shift mechanism spring	109/121	5	6
	86	Replace tilt tape	110/122	5	6
	87	Replace type bar links	111/123	6	6
	88	Replace worn backspace pawl bracket	112/124	6	5
	89	Rethread damaged parts	113/125	5	4
	90	Solder type heads (bars)	114/126	7	7
	91	Straighten carriage release	115/127	5	5
	92	Tighten left margin center post	116/128	5	4
D		MAINTAINING AND REPAIRING CALCULATORS			
	* 1	Adjust add-subtract gate centralizers	--	2	4
	* 2	Adjust back carriage support rail	--	2	3
	* 3	Adjust bottom carriage support rail	--	2	3

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
D		MAINTAINING AND REPAIRING CALCULATORS (continued)			
	* 4	Adjust calculator clear assembles	--	4	4
	* 5	Adjust division direction control slides	--	3	5
	* 6	Adjust carriage mechanism	--	4	4
	* 7	Adjust counter blocking slides	--	3	3
	* 8	Adjust counter reverse lever assemblies	--	2	2
	* 9	Adjust cycle lock pins	--	1	3
	* 10	Adjust division settings levers	--	4	4
	* 11	Adjust lock bar operating assemblies	--	3	3
	* 12	Adjust main clutch assemblies	--	5	5
	* 13	Adjust motor units	--	5	5
	* 14	Adjust multiplier units	--	4	5
	* 15	Adjust negative multiplier key assemblies	--	4	4
	* 16	Adjust numeral keyboard	--	5	4
	* 17	Adjust selection cams	--	4	6
	* 18	Adjust selection mechanisms	--	4	5
	* 19	Adjust shift control lever assemblies	--	3	4

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
D	MAINTAINING AND REPAIRING CALCULATORS (continued)				
	* 20	Adjust shift drive idler assemblies	--	4	3
	* 21	Adjust wedge shaft assemblies	--	1	2
	* 22	Align carriage clamps	--	2	3
	* 23	Align main clutch assemblies	--	4	4
	* 24	Clean the calculator	--	6	6
	* 25	Form bent counter mechanism parts	--	4	4
	* 26	Form counter blocking slides	--	3	2
	* 27	Form counter reverse lever assemblies	--	3	3
	* 28	Form defective calculator clear assemblies	--	4	4
	* 29	Form defective carriage	--	3	4
	* 30	Form gear train components	--	2	2
	* 31	Form numeral keyboard parts	--	5	4
	* 32	Form selection arms or cams	--	4	4
	* 33	Form selection mechanism parts	--	4	4
	* 34	Lubricate the calculator	--	6	6
	* 35	Overhaul the motor	--	3	4
	* 36	Perform carriage to base adjustments	--	3	2

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
D	MAINTAINING AND REPAIRING CALCULATORS (continued)				
	* 37	Remove carriage and components	--	4	4
	* 38	Replace calculator clear assemblies	--	4	4
	* 39	Replace calculator lift cams	--	3	3
	* 40	Replace carriage and components	--	4	3
	* 41	Replace counter blocking slides	--	1	3
	* 42	Replace counter mechanisms	--	4	4
	* 43	Replace counter reverse lever assemblies	--	2	2
	* 44	Replace cycle lock pins	--	1	2
	* 45	Replace gear train components	--	4	3
	* 46	Replace lock bar operating assemblies	--	3	2
	* 47	Replace main clutch assemblies	--	4	4
	* 48	Replace motor belts	--	5	3
	* 49	Replace motor condenser	--	5	3
	* 50	Replace motor pulleys	--	4	3
	* 51	Replace motor starting switch and components	--	6	4
	* 52	Replace motor units	--	4	3

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
D	MAINTAINING AND REPAIRING CALCULATORS (continued)				
	* 53	Replace multiplier units	--	3	3
	* 54	Replace negative multiply key assemblies	--	3	2
	* 55	Replace numeral keyboard components	--	7	4
	* 56	Replace reverse lock mechanisms	--	1	1
	* 57	Replace right setting line assemblies	--	1	2
	* 58	Replace selection arms or cams	--	3	2
	* 59	Replace selection mechanisms	--	4	2
	* 60	Replace selection segments	--	3	3
	* 61	Replace shift clutch driver gear assemblies	--	4	3
	* 62	Replace shift control lever assemblies	--	3	3
	* 63	Replace shift drive idler assemblies	--	2	2
	* 64	Rethread damaged parts	--	3	3
	* 65	Time counter mechanisms	--	3	3
	* 66	Time gear trains	--	4	3
	* 67	Time right setting line assemblies	--	2	1
	* 68	Troubleshoot circuit board with scope	--	0	2

DUTY	TASKS NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	STANINE VALUES DOT 1	DOT 2
D		MAINTAINING AND REPAIRING CALCULATORS (continued)			
	* 69	Repair circuit board	--	0	1
	* 70	Repair damaged board parts/components	--	0	1
	* 71	Repair printing mechanism on electronics/signals, etc.	--	0	1
	* 72	Repair ribbon assemblies	--	0	1
	* 73	Replace keyboard parts on electronics/signals, etc.	--	0	1
	* 74	Clean circuit board	--	0	1
	* 75	Clean keyboards on electronic calculators	--	0	0
	* 76	Analyze tapes from electronic calculator	--	0	0
	* 77	Replace printer components	--	0	0
E		MAINTAINING AND REPAIRING DUPLICATOR			
	1	Adjust cylinder	117/129	2	3
	2	Adjust motor drive assembly	118/130	4	5
	3	Adjust paper feed mechanism	119/131	4	6
	4	Adjust print control mechanism	120/132	4	5
	5	Align the cylinder	121/133	3	4
	6	Clean the cylinder	122/134	3	6

	TASKS			STANINE VALUES	
DUTY	NUMBER	DESCRIPTION	PERFORMANCE OBJECTIVE CUMULATIVE NO.	DOT 1	DOT 2
E	MAINTAINING AND REPAIRING DUPLICATOR (continued)				
	7	Clean the duplicator	123/135	4	6
	8	Install duplicators	124/136	4	5
	9	Lubricate duplicator	125/137	3	5
	10	Perform operational checks	126/138	4	5
	11	Replace broken paper feed parts	127/139	3	5
	12	Replace clutch pulleys	128/140	3	4
	13	Replace motor assembly	129/141	2	4
	14	Replace reeves pulley	130/142	2	3